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THE WORLD'S LEADING R/C CAR MAGAZINE

March 1998

NEW NOVAK ATOM
MICRO SIZE, MAXIMUM PERFORMANCE!

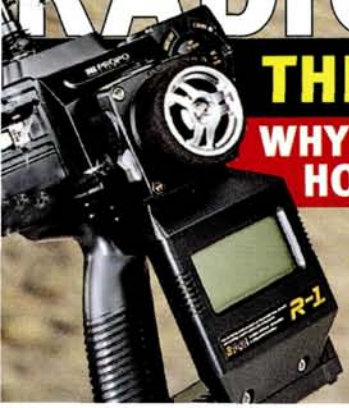
FIRST TEST! ASSOCIATED B3

CHAMPIONSHIP-WINNING CARS
Steal these setups!

HOW TO
Trick sedan detailing tips

RACER NEWS
Get the inside line

COMPETITION RADIO GUIDE



THE PRO'S PISTOLS
WHY THEY CHOOSE 'EM, HOW THEY USE 'EM

Midnight 2
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Isn't technology wonderful?

Today's computerized radios can do more than ever before to help us drive faster and with greater precision. To show what the new transmitters can do, we've compiled the data of the hottest computer radios in our **Competition Radio Guide**. In addition to an at-a-glance features chart, there's a helpful glossary of terms, comments from the pro's and setup tips for the average guy—like me. Speaking of fancy radios, nothing beats having an equally trick car at the receiving end of the waves. Nothing could be hotter in that respect than the new **Associated RC10B3**. Our "Thrash Test" includes Mark Pavidis' own setup tips and an insightful interview with ace R&D guy Cliff Lett. Want more racin' stuff? You're bound to enjoy our new **"Racer News"** section. We've interviewed the hottest racers and industry insiders—this month: Gil Losi Jr. and Brian Kinwald—and we have the latest in racing technology, tips to make you faster and a whole lot more. If it's racing, it's in "Racer News"—every month. Here's more news: Novak will soon release a super-hot new ESC. The company's latest orange hot-box is the **Novak Atom**. The Atom packs the Cyclone's features and programmability into a super-mini package. This tiny terror just might be the biggest—and smallest—news to hit our hobby this year! Check out the Atom with our "First Look" on page 100.

Peter Vieira, Editor
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Radio Control CAR ACTION

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READERS WRITE

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., *Radio Control Car Action,* 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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A Track Near You?

First, great magazine! I always hear of carpet racing and indoor tracks with carpet. What type of carpet should be used? I'm asking because I'm looking into starting a hobby shop and will be sharing a 30x60-foot carpeted room with another store; they have the room during the day, and I have it at night. Do you think this area is too small for 1/10 Tamiya electric touring cars? Any help would be wonderful! Keep up the good work.
DONALD SPENCE
via email

Good luck in your venture, Donald. Carpet tracks are made of Ozite. This brand of carpet is hard-wearing and will not load the cars with static electricity. Even if the carpeting in your space is R/C-friendly, be aware that R/C cars are tough on carpet; if the track area has to double as retail space for the business you'll share the shop with, you could have problems. Even if you can't install a permanent carpet track, there are other ways to go racin'. A parking-lot course is a great way to put a track together for minimal cost, and when the day's racing is over, the track disappears! Don't forget to get your shop listed in our directory!
—George

Mild or Wild?

Since you get tons of letters each month, I'll keep this short. I own a Tamiya Castrol Celica (TA02) with a Novak Rooster. The instruction sheet says that motors should be limited to stock or mild modified (no fewer than 16 turns).

Here's my question: what is your definition of a mild modified motor? In your October issue, there are two "Readers' Rides" using a Novak Rooster with Onyx (14T) and Topaz (11T) motors. Aren't those motors too hot for the Rooster? Keep up the radical work!
SIMON VENNE
Montreal, Quebec, Canada

The Novak Rooster is a tough ESC, and I bet those readers aren't having any trouble spinning those motors. An ESC's motor limit is based on the number of amps the ESC can handle versus the typical amp draw of the specified minimum-wind motor. Even if the user adheres to the minimum-wind number, a jammed comm or an overgeared tranny can cause the motor to draw enough amps to damage the ESC. Conversely, a "hotter" motor that is geared low may be safely operated even though it is below the recommended wind minimum. Nonetheless, I would stick with the 16-turn limit to avoid jeopardizing your warranty. A 16 is plenty quick, and it's better to be safe than sorry!
—George

"Readers' Rides" Rules!

Your magazine is the greatest! I have learned a lot from it. My first question has to do with the "Readers' Rides" section.
I know that you must get hundreds of photos each month, and I imagine sorting through them to find the right ones to print is tough. I am sure that everyone reading has sent in a photo thinking that his car or truck is worthy of making it into your mag. Have you thought of publishing or are there any plans to publish a special issue of *R/C Car Action* with nothing but our rides? I think that one issue a year should be dedicated to all of us who love this hobby instead of just five or six "Readers' Rides" each month.
TERRY BRANCHEAU
Misawa, Japan

I'm glad you enjoy the mag, but an entire issue of nothing but "Readers' Rides"? Who knows? Maybe it could work. We could follow it up with an "all 'Pit Tips' " issue or a nuthin-but-"Chris's Back Lot" special edition. Ah, maybe that's not such a good idea.
—Greg

Pullin' Proponent

Please allow me to begin by saying THANKS for producing such a great magazine. I just ordered my first subscription and look forward to getting back into the R/C car hobby. I am very interested in picking the hobby back up and am amazed by the changes in technology and classes of R/C cars. Whenever I go to my local hobby shops, I keep running into the same problem: I want everything I see! Before I get the bug again, I want to read up on all the different types of R/C cars. I am particularly interested in R/C truck pulling, but from what I've read so far, this doesn't seem to be a sizable area of R/C cars. Even still, I think it's an area I need to look into because every time I see a monster truck, I can't help but bellow out that ever popular Tim Taylor "primate rumble!"
RODNEY D. ARNOLD
Sherwood, AR

The pulling scene is one of R/C's smaller niches, but it is also one of its most passionate. Give a shout to the guys at the National Radio Control Truck Pulling Association (NR/CTPA); they're the ultimate source of all things pulling and monster-truck related! You can write to them at: NR/CTPA 2649 Ferndale Ave. Wanakah, NY 14074. ***—Pete***

Love that Rustler

I bought my six-year-old son a Traxxas Rustler for Christmas. This is the most durable R/C vehicle I've ever seen. This thing was run over by a bicycle, stepped on and sat on by my 31-pound daughter with no damage to the vehicle (except for the body, which Shoe Goo fixed). This truck has hit mailboxes, trees and everything else my boy could find, without damage.

After three months of abuse and about 20, 8-foot jumps with the throttle pegged on landing, one of the gears finally let go. We'll be installing that optional slipper clutch, thank you! If you are looking for an entry-level truck that is almost indestructible, the Rustler is it. This truck is an excellent backyard basher or first R/C vehicle; it's cheap, fast and durable.

In case you're wondering, I have no affiliation with Traxxas!
STEVE DRIER
Houston, TX

Errata

We goofed! The distributors of the Kawada M-24 Tripmate and ABC Hobby Pocket Racer reviewed in the January 1998 *R/C Car Action* were incorrectly listed in that issue's Index of Manufacturers. For more info on the Kawada M-24 Tripmate, contact Sunrise R/C Ltd., 23324 SE 289th St., Kent, WA 98042; (360) 886-7160; fax (360) 886-2871. For information on the ABC Hobby Pocket Racer, contact Joylite Marketing Corp., 6060 Williams Rd., Richmond, B.C., Canada V7E 1K5.

Also in the January issue, in "What's New," incorrect prices were given for the Innoventive Technologies CVEC Power System. The HSU-100 (straight-through exhaust) and HSS-100 (side exhaust) pipes retail for $56.95 each. The pipes are also available in anodized colors at $59.95; just add the appropriate letter to the part number—purple(p), gold (g), blue (b), or red (r). ■

BY CHRIS CHIANELLI

Super Associates

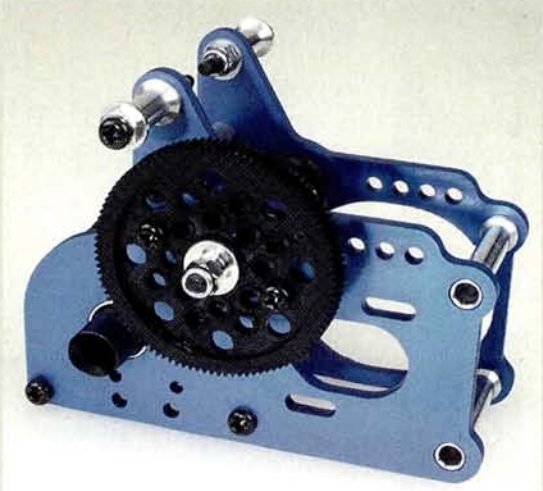
After extensive research at the Associated testing grounds and subsequent "real-world" testing under actual race conditions, it's official: Associated and Thunder Tiger have teamed up. Thunder Tiger's Pro-12BZ and Pro-15BZ will now be offered with Associated's RC10GT. I truly believe that this is one of the most awesome nitro racing packages to be offered in quite some time. Associated's name goes back to the beginnings of our great hobby. When the folks there link their name with another manufacturer's product, it's a telling endorsement, and I couldn't agree more with them about this one.

Thunder Tiger is probably one of the best-kept secrets on the nitro racing scene. Here's why: a dozen or so years ago, famous engine designer Mr. Mihara (formerly of O.S.) went to work with Thunder Tiger, and the simple result is that Thunder Tiger engines have gotten better and better. People in the know all agree: Mihara-san is a creative genius when it comes to glow-engine design. In my humble opinion, Thunder Tigers of the past five years or so are some of the smartest engine-purchase options available. They are reliable and powerful, and they sport true ABC technology—meaning the cylinder liners are true chrome-plated, not nickel plated. Nickel is good and works well; chrome is better. It's harder and more resistant to wear. And guess what? They're also priced right.

These engines, which are both available with and without a pull-start, have specially machined shafts to fit the RC10GT perfectly (and the RC10 Nitro Dual Sport); no modification is required on the part of the racer. As I said, Associated and Thunder Tiger really worked together on this one, and you, the modeler, are the beneficiary. Available from Ace Hobby Distributors Inc., 116W. 19th St., Higginsville, MO 64037; (800) 322-7121.

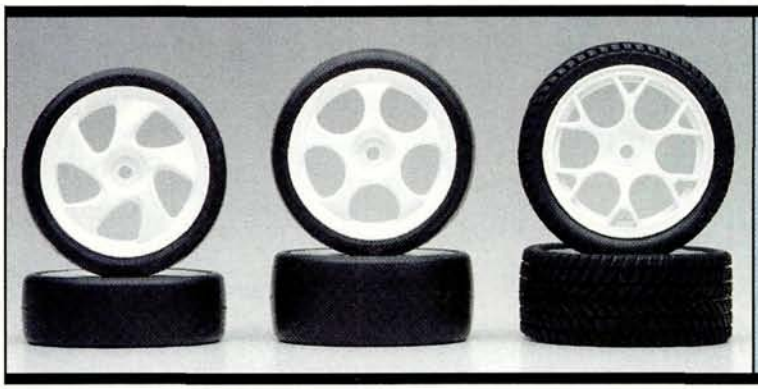
The M-chassis gets belted!

Looking to pack a little more punch into your Tamiya M-mobile? You can transform your Tamiya M02 chassis into a mini land missile with Tech Racing's Belt Drive Conversion Kit. The unit replaces the stock plastic gearbox and all its gears with a lightweight, efficient belt-drive system. Only a pan car has a more simple drive train! The kit includes a high-quality ball diff for improved cornering, and interchangeable spur gears allow a broader range of gearing choices without the need for metric-pitch pinions. The aluminum construction also has better heat-dissipating properties than the plastic kit pieces. As an added bonus, the Tech conversion has fewer parts, trims weight, and looks cool, too. Heck, the unit's blue-anodized aluminum construction alone should scare your competition. Want one? GTP California's got 'em, along with a ton of rims, tires and other hop-ups for the M-chassis cars. They can also hop up your TA03; check out the Cross project car in this issue! Call GTP California, 600-A Anton Bld. (404), Costa Mesa, CA 92626; (714) 756-1219; fax. (714) 756-1227.



Major Tom's **Mercedes**

Ira Dahm always seems to have something new up his sleeve, and this month, the bulge up there looks like a Mercedes—a Mercedes CLK-GTR, to be exact. In addition to the usual fine molding and high-quality Lexan, the new MB also features an "extreme" wing with aero supports, a separate rear spoiler and a complete decal sheet. Designed to fit all 190mm sedans, the MB CLK-GTR is available in .030 "light" Lexan or standard-weight .040. Contact Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931; (707) 792-1316; (fax) (707) 792-0137



PRO-LINE'S **Narrow & Super-Narrow**

Pro-Line's new sedan wheels are the perfect performance and style hop-ups for today's new generation of sedans. Warlock, Inferno and Typhoon sedan wheels are light, bolt-on options for your favorite car (all available in narrow standard and super narrow). Molded in white, black and/or chrome, these latest offerings from Pro-Line are 1.9 inches in diameter, so they will fit standard Tamiya, HPI, Yokomo and Kyosho vehicles. For more information, contact Pro-Line, P.O. Box 456, Beaumont, CA 92223; (909) 849-9781; fax (909) 849-2968.

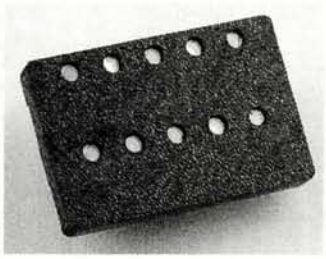
Switch Blade 12 SJ

Designed By World Champions Joel Johnson And David Spashett

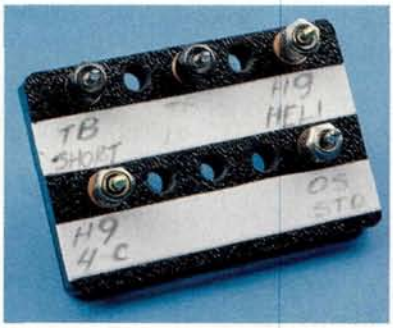
- New Front End Geometry For Lower Roll Center
- New Stronger Carbon Fiber Chassis Material
- Battery Location Moved Back For Better Traction
- Symmetrical "T" Bar
- New Pod Design Makes Soldering Wires Easier
- Motor Repositioned For Lower Center Of Gravity
- Repositioned Shock For Better Rear To Front Transfer
- New Composite Rear Axle
- Purple Aluminum Screws

SB9812, $250.00

Enforcer Plug Paddock



To me, a glow plug is a vitally important component for dependable glow-engine operation. It's the first thing I check if I'm having a problem. Why then, did I abuse my poor glow plugs by letting them roll around on the floor of my pit box for so many years? Now, I ask you, can a glow plug that has been "tarred and feathered" with track dust and traction compound be operating at 100 percent? I DON'T THINK SO!! Enforcer Mfg.'s new Plug Paddock guards your plugs' delicate elements, keeps them all in one easy-to-find place and protects your investment—not just the $10 investment that some plugs cost, but the cost of a lost race!



Wait! I almost forgot. The back of each threaded hole is shielded with clear plastic, so without removing the plug, you can conveniently light it to see whether it's glowing properly. The white areas can be marked with a pencil so that you'll quickly be able to identify your plugs by manufacturer and heat range—in my opinion, a totally cool product for only $6.95. Available directly from Warehouse Hobbies, 1180 C.R. 621 East, Lake Placid, FL 33852; (888) 444-1995 (toll-free); in Florida, call (941) 699-1231; fax (941) 699-0360.

TA03 Pro

David Jun Special Edition

When David Jun wowed the sedan-racing world at the '97 ROAR Nationals with his winning TA03, everyone wanted to know which hop-ups he used and how he used them to set up his winning sedan. Well, Tamiya has gone one step further: a consumer version of Dave's victorious machine is now available. It features several key hop-ups (some currently available nowhere else). Rumor has it this Special Edition version adds up to one winning, yet affordable, package. Stay tuned for more info in upcoming issues.

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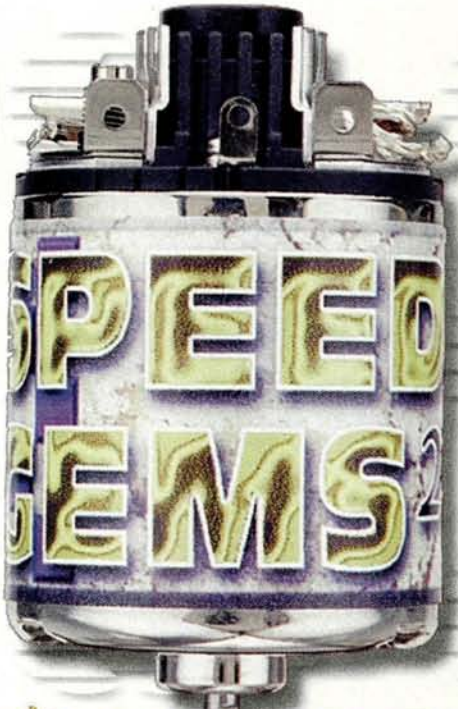
Updated For 1998!

- Stronger 5.4v Wet Magnets
- New 1.3mm Motor Can
- New Endbell
- Thicker Gauge Wire
- More Torque And Power
- More Efficient Operation
- All New Look

New!

9210 Topaz, (11 Triple)
9211 Ruby, (16 Triple)
9212 Sapphire, (17 Single)
9213 Diamond, (12 Double)
9214 Onyx, (14 Double)
9216 Jade, (15 Quad)
9217 Quartz, (19 Double)
9218 Opal, (10 Triple)
9219 Platinum, (13 Triple)



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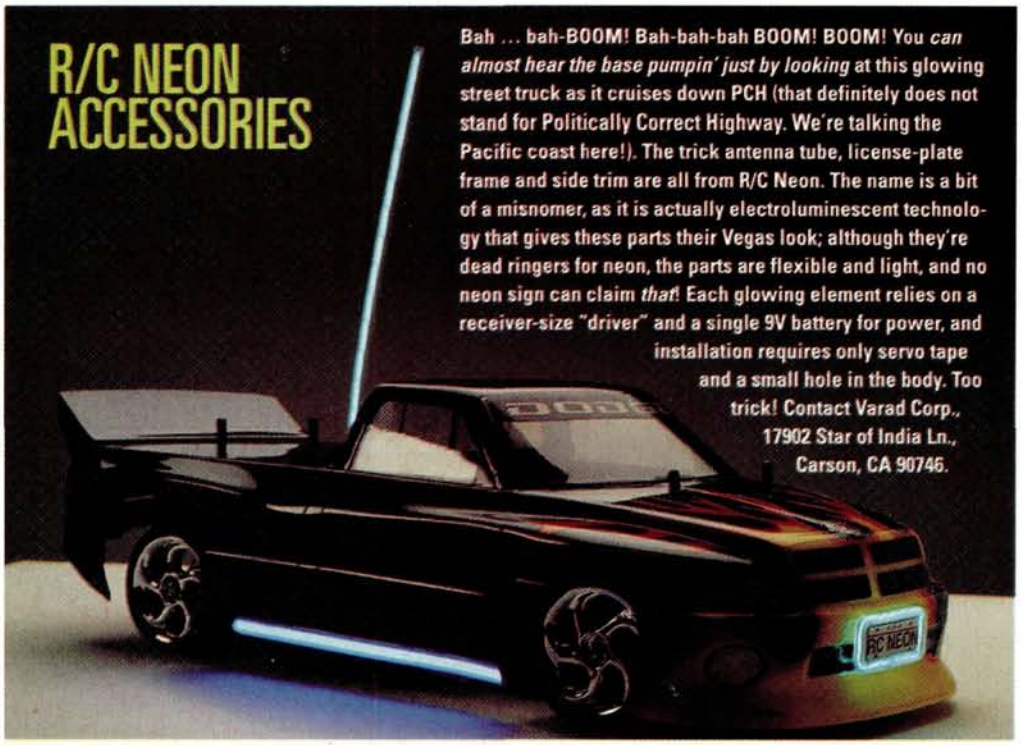


Bah ... bah-BOOM! Bah-bah-bah BOOM! BOOM! You *can almost hear the base pumpin' just by looking* at this glowing street truck as it cruises down PCH (that definitely does not stand for Politically Correct Highway. We're talking the Pacific coast here!). The trick antenna tube, license-plate frame and side trim are all from R/C Neon. The name is a bit of a misnomer, as it is actually electroluminescent technology that gives these parts their Vegas look; although they're dead ringers for neon, the parts are flexible and light, and no neon sign can claim *that*! Each glowing element relies on a receiver-size "driver" and a single 9V battery for power, and installation requires only servo tape and a small hole in the body. Too trick! Contact Varad Corp., 17902 Star of India Ln., Carson, CA 90746.

Super Grease

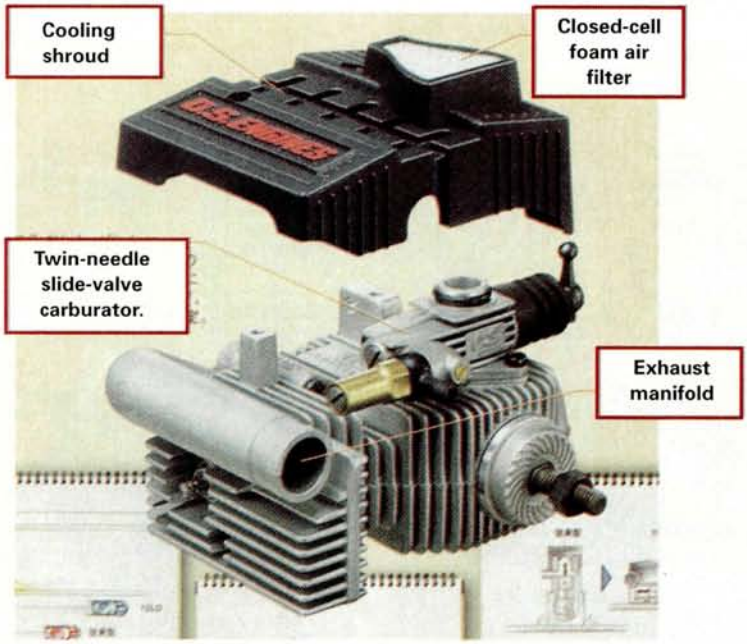
Finish Line Technologies—well-known purveyor of slippery stuff to the cycling industry—has entered the R/C arena with its new Bearing Gel. This new lube features Du Pont Krytox—an ultra-slick compound that resists extremes of pressure and heat (how does thermal stability up to 650 degrees sound?) and also inhibits corrosive oxidation. According to Finish Line, water and salt will not break Bearing Gel down. The handy, re-sealable syringe dispenser makes precise application easy.

I've heard some very interesting things about this product; for instance, unlike some types of grease that can attack rubber, Krytox actually conditions and rejuvenates old tires and other rubber components. For more information, contact Finish Line Technologies, 1545 Fifth Industrial Ct., Bay Shore, NY 11706; (516) 666-7300; fax (516) 666-7391; email: FLlube@aol.com.

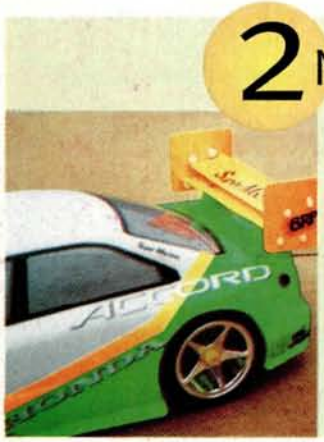
O.S.'s New "Side-Winder"

Is this the most innovative R/C car engine design in years, or what? If it's as powerful as it is unique, watch out! The laydown design of the O.S. .12 LD lowers the car's center of gravity, so it improves its stability. And it will fit under sleek bodies more easily without that ugly cylinder head sticking out of your beautiful scale body. We're talking prettier cars with less drag. We're talking function and form benefits here.

According to the manufacturer, the increased fin area takes advantage of under-body airflow to substantially aid cooling. The laydown design is bolted directly onto the chassis, so modifications or conventional engine mounts are not required. The .12LD features a recoil-starter system, a type 10F slide-valve carburetor (that's right, I said *SLIDE*-valve carb) and a built-in air filter. Comes with no. A3 glow plug and exhaust header. Availability and price haven't yet been determined.



2 New for Touring



Trying to get your touring car to hook up a bit better? BRP now offers a Lexan wing and traction compound that might do the trick. Buddy (the "B" in BRP) has applied his extensive years in racing and design to developing the T.C. Super Wing, which he truly believes is the ultimate sedan wing. The T.C. Super Wing features: screw-together assembly (for easy painting), adjustable lower kick-up, large side dams, mounting hardware, and instructions that include assembly, mounting and detailing procedures.

Next is BRP's Parking Lots A Bite—a specially formulated rubber conditioner that softens the outer skin of racing tires to enhance traction. It's good for touring cars, off-road and superspeedway tires. For a complete catalog, send $2 with a large, self-addressed, 55-cent envelope to BRP Inc., 1575 Lowell St., Dept. RCCA Elyria, OH 44035; (440) 284-0270; fax (440) 284-0271.

READERS' rides

sponsored by NOVAK ELECTRONICS, INC. RACING TEAM

"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send us a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. If we choose to feature your creation, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the eighth annual "Readers' Rides of the Year Contest" in the fall of 1998. The winner will be awarded $500 and an assortment of electronic R/C equipment furnished by Novak Electronics Inc. Our second and third choices will also receive an assortment of Novak electronic R/C equipment. In case we need to contact you, write your address and phone number on your letter and on the back of every photo you send. Good luck!

Double Take

Ben Coong of Los Angeles, CA, has us seeing double with his YokomoYR-F2 race car. Ben thrives more on making the car look good than on making it run fast; in fact, he is happy with the way his Gamma T motor performs and just plays around with gearing rather than purchasing new motors. An Airtronics Rival radio, a Dynamite ESC and a 1400mAh battery round out the rest of the reflective ride.

Rock Solid

Brian Carl of Plymouth, MI, is always looking for challenging obstacles to overcome with his Traxxas Stampede. Brian equipped it with a Futaba Magnum Sport radio that was "inexpensive but has been extremely reliable." A Novak Duster II ESC sends the juice to the Warlock 17-turn motor and makes the truck hit some serious speeds. The transmission is decked out with ball bearings, aluminum gears and hardened outdrives to ensure that the drive train can handle the power. As the photo shows, this truck performs over any terrain.

Ghost Driver

Jean-Francois Duchesne from Belgium mesmerizes us with his X-ray vision, used here on an OFNA Pirate 10. If you look deep inside, you'll see the O.S. CZZ engine fitted with an MIP pipe and a 3-shoe clutch. You may also notice the Kyosho 1/8-scale shocks mounted to custom fiberglass towers that allow the car to run on any surface. As you might have guessed, Jean-Francois' car is "clearly" a lot of fun.

Tennis Court Terror

Ron McCormick of Independence, KY, sent us this photograph of his beautiful Thunder Tiger on-road nitro, which is equipped with a Thunder Tiger Pro12BZX engine. A JR Python pistol-grip radio controls this road racer, and Ron hand-painted and detailed his Protoform Monte Carlo to replicate the popular Du Pont stock car. He also threw on a full set of Pro-Line radials to keep this car on track.

Stretching the Boundaries

Chris Scott of Prince George, British Columbia, Canada, proudly displays the Kyosho USA-1 monster truck that he loaded up with aftermarket goodies. He started his conversion with a Sassy Chassis stretched aluminum chassis. From there, he added eight Kyosho heavy-duty, oil-filled

shocks to replace the stock boingers. Thorp metal gears fill the front and rear transmissions, which ride on a full set of ball bearings. Chris operates his truck with an Airtronics RV2PS radio, a Futaba S9303 servo, a Trinity 1700 7-cell spec pack and a Novak Hammer ESC.

Team Associated Trio

This collection of green Team Associated vehicles belongs to Robert Amo of San Angelo, Texas. These cars could have been appropriately named the "tricked-out trio" considering all the parts that Robert added. The RC10T2 and B2 are topped off with HPI bodies and have identical electronics that include Trinity Ex-Tech 1700 batteries, Reedy Fire Hawk motors, Tekin TSC G-12 speed controls and Futaba radio systems. MIP shiny CVDs and outdrives put the power down from the transmission. Associated Unobtanium shafts and Lunsford products are incorporated in the suspension. The RC12LS has a Protoform body and uses the same electronics and Sanyo cells. Robert is 53 years old and enjoys racing these cars whenever he has a spare minute. He also included a photo (not shown) of all his trophies; this guy must be good!

Is it Real

If we hadn't seen the body posts in the photo sent by William Lan of Richmond, British Columbia, Canada, we would have thought he'd sent a photo of his full-size car. Underneath the custom-detailed body with handmade rear spoiler and license plate, lies a Yokomo YR4-M2. The controlling signals come from KO radio gear. A Novak Cyclone speed control regulates the power to the Cam super-modified motor. William even picked up some Tamiya wheels to match those of his full-size car.

American Wildlife

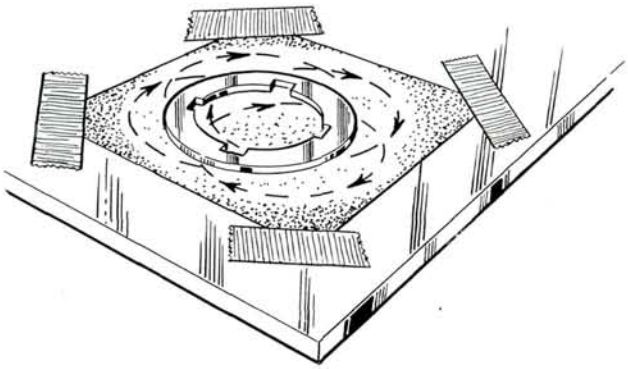
Tony Besson of Westlake Village, CA, likes truckin' through the woods with his Team Associated RC10T2. His electronics include an Airtronics Caliber 3PS radio with 94157 servo, Novak Cyclone ESC, Team Orion 2000 battery and Trinity D2 motor. Tony went the extra mile and had the chassis re-anodized and the Dahm's body custom-painted. To top it off, RAM lights were added to light up the trails at night.

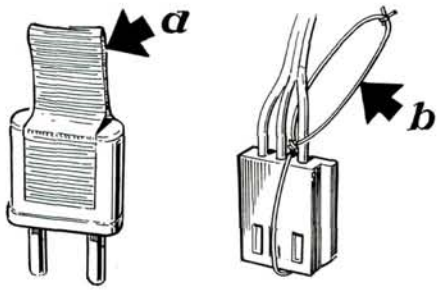
NOVAK ELECTRONICS, INC. RACING TEAM

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many good tips because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one, nor can we return unused material.

Disc Jockey

Worn diff rings can be reclaimed by rubbing them on 600-grit sandpaper taped to glass. Use a circular motion to polish the rings, and tape the edges of the glass to protect your fingers.
BLAINE BOWLE, Tucson, AZ



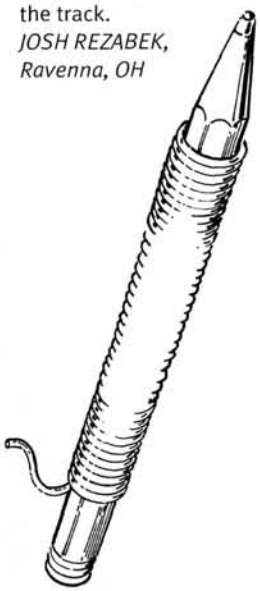


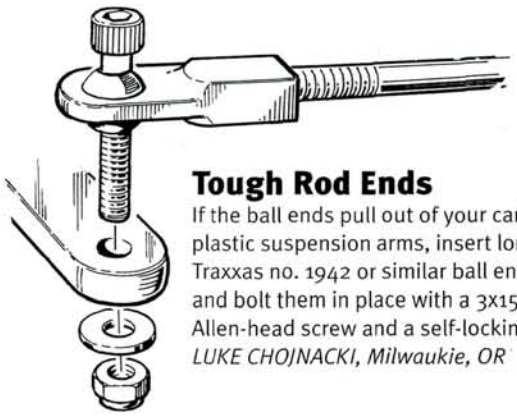
Pull Tabs

It is easy to extract the radio crystal if you stick a packing tape tab to it as shown (a). To make it easier to extract receiver plugs, tie a fine nylon or Dacron thread (b) around the plug's handle, rather than pull on the fine servo wires.
DAEVON MORRIS, Hermosa Beach, CA

Solder Stick

Instead of crowding your toolbox with a large roll of solder, wind some around your ever-useful ballpoint pen. That should be more than enough for minor repairs at the track.
JOSH REZABEK, Ravenna, OH



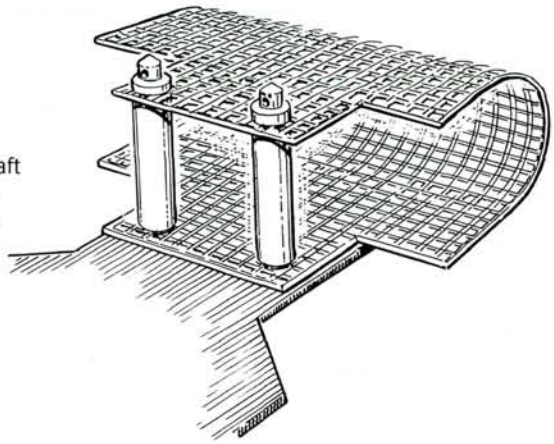


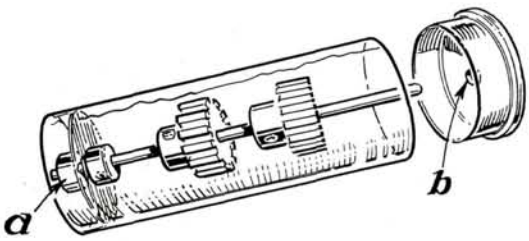
Tough Rod Ends

If the ball ends pull out of your car's plastic suspension arms, insert longer Traxxas no. 1942 or similar ball ends and bolt them in place with a 3x15mm Allen-head screw and a self-locking nut.
LUKE CHOJNACKI, Milwaukie, OR

Basket Weave Bumper

Plastic needlepoint canvas from the craft store can be shaped and then trapped under the body mounts to make a very springy, energy-absorbing bumper.
MIKE BROWN, Walton, WY





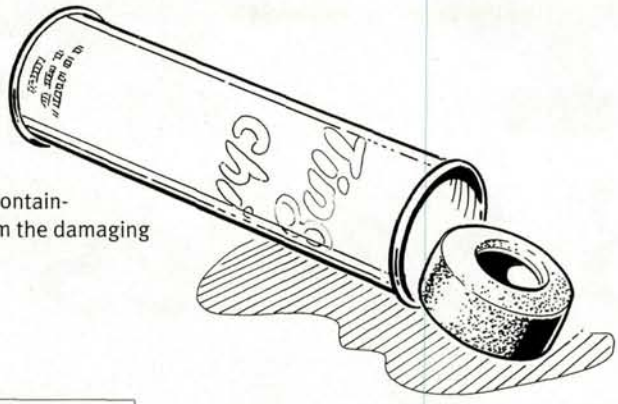
Pinion Protector

Store your spare pinion gears in a plastic candy tube. If you drop them, they will be protected. Drill a hole in the base of the tube, and insert a piece of coat-hanger wire secured with wheel collars (a). Allow the wire to extend slightly so that it is supported by another hole (b) in the lid.
KYLE TANTIWONG, Tajunga, CA

Tasty Tires

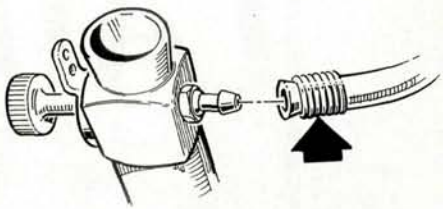
Carefully wipe the grease out of a Pringles potato chip container with a solvent-dampened rag, dust the inside with a little French chalk (from the drug store), then use the container to store your spare tires away from the damaging effects of sunlight.

ANH PHAM, San Jose, CA



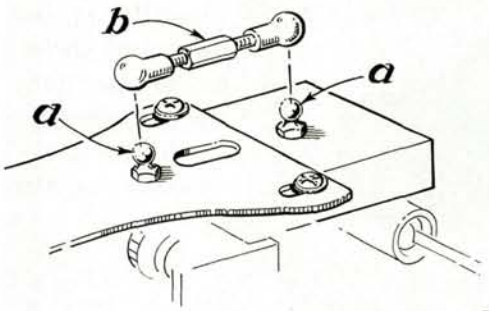
Spring Fever

Pull the fuel line through a short spring before pushing it onto the carburetor nipple. This will prevent the line from



popping off the nipple in the middle of a race, while allowing it to be quickly detached.

JIM NEWMAN, Kansas City, KS
(no, not the columnist!)



Yokomo Twister

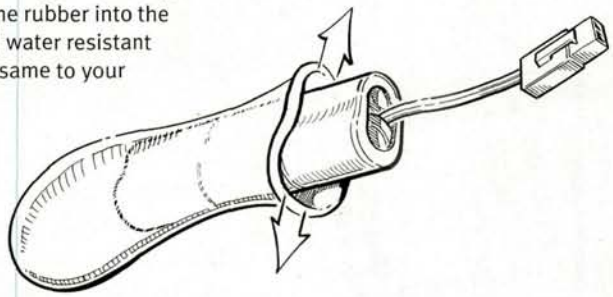
To easily adjust belt tension on your YR-4 and similar types of chassis, install ball ends (a) and a turnbuckle (b). To tighten the drive belt, loosen the top plate's screws, twist the turnbuckle, then tighten the screws again.

ERNEST LIMBO, Cerritos, CA

Battery Raincoat

Stretch the neck of a party balloon until you can drop your battery pack inside, then bind the neck of the balloon tightly over the wires with strong cord. Finally, squeeze some silicone rubber into the neck to make a good water resistant seal. You can do the same to your receiver too.

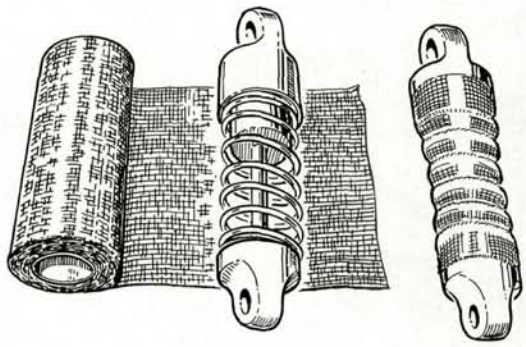
MIKE BRANGSTRUP, Marbella, Spain

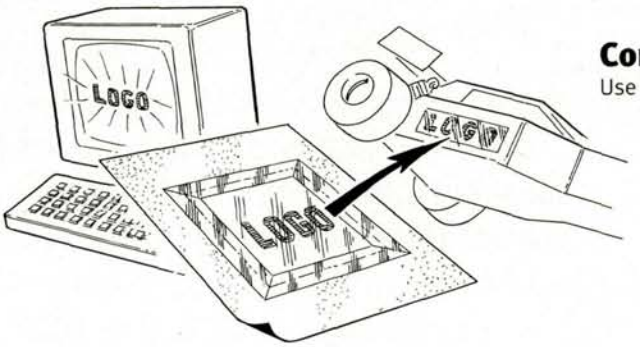


It's a Wrap

A single wrap of 3M Vetrap will keep dirt out of your shocks and help them last longer. Vetrap is bandage material used mostly on horses, and it's available from veterinary supply stores.

LEE ZIRK, Broken Arrow, OK





Compu-Logo

Use a graphics program to create your own logos. Tape a piece of transparent, self-adhesive shelf vinyl to a sheet of paper with thin acetate tape, then print your design on a laser color printer. Cut out the logo, peel off the backing, then stick the logo on the car. Protect the printed image with a layer of the same clear vinyl.

JIMMY LI, New York, NY

TROUBLE shooting

your r/c problems solved

BY DOUG MERTES

If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at *Radio Control Car Action*, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, *Radio Control Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

Soft Shocks

The front end of my RC10 tends to rise as it accelerates; it also has a problem turning in and holding a turn at speed. I think the front end may be too light because it uses so many lightweight parts; I've installed titanium hinge pins, turnbuckles and ball ends. I use an Airtronics 94151 steering servo and ball-bearing steering linkage, so I don't hit the wall too often, but I'm worried about the car pushing so badly. Should I put some weight on the front end, or go back to the original, heavier parts?

RICHARD MAYORGA
Santa Ana, CA

Richard, there's an old axiom in off-road racing that can help us out here: when you have a handling problem, look at the other end. In your case, you say that your car's front end rises up at the starting line. That's not because it's too light; it's because the rear shocks and springs are too soft! When you nail the throttle at the line, the horsepower transferred through the gearbox actually makes the car's rear end squat. The rear shocks, among other things, resist this action on your RC10. I don't know which springs you have fitted back there, but start with a pair that's considered midway between soft and hard, and before you install them, check to make sure that they are the same length. To increase damping and further inhibit squatting, refill your rear shocks with some 40WT oil, and be sure that both of them are properly filled and bled. Whatever you do, don't resort to soft shocks to obtain traction. With all of the new tire patterns and compounds available out there, let your tires do the diggin', and your shocks can take care of the suspendin'.

Stripped Spur Gear

I have a brand-new Traxxas Nitro Stampede with only about 10 runs on it. Even though I drive carefully, I have already stripped the plastic 66-tooth spur gear. Does anyone make a metal spur gear for this truck? All the other gears on the truck are steel, so why not this one? I appreciate any help you can give me! Thanks.

ROB TESSIER
via email

Rob, there's a reason that the spur gear in your Stampede isn't metal: it's the only thing that "gives" in an impact! If all the gears were metal, you'd do real damage to the tranny and gear train—not to mention the motor's internal parts—if there wasn't something a little soft somewhere along the line. Still, you say that you're a careful driver, and 10 runs certainly isn't a lot of use for a vehicle with the reputation of the Stampede. Is it possible that your gear mesh is too tight? Just because the gears meet and rotate, that doesn't mean that the gap between the gears (called "lash") is correct. The larger the gear tooth, the more clearance it needs so that the individual teeth can fit into the "valleys" on the opposing gear. You should be able to rock the spur gear against the pinion just enough to make it tick. You can also place a slip of paper between the gears as a spacer when you install your new spur; using this paper spacer will ensure that the lash is set properly, and that should protect your new part from being chewed up. Don't forget to remove the paper before you run!

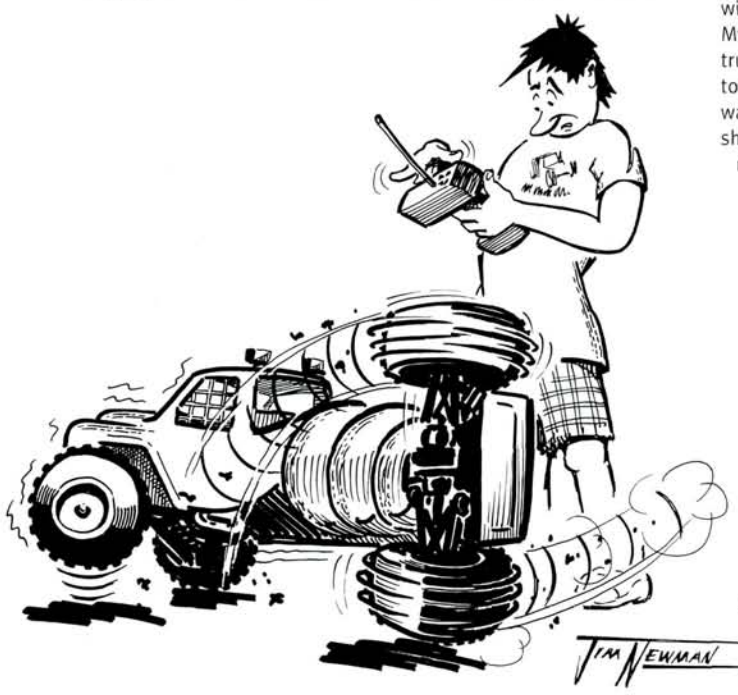
Wiper Arm Woes

I just bought my first R/C vehicle—a new MRC Ironman truck—and I have a really weird problem with acceleration. When I'm at half throttle, the car is fine, but when I pull the trigger all the way back, the truck stops! Is this just a glitch, or is it something more serious? Could you please help this first-time R/C fan? Thank you!
KYLE HARWOOD
via email

Kyle, your Ironman is well-designed and well-manufactured, but even the best R/C stuff needs maintenance and adjustment from time to time! I believe that the mechanical speed control that came with your truck is the source of your problem. It sounds as if the wiper arm (the part that turns when you squeeze the throttle trigger) either isn't reaching the full-throttle contact or is overshooting it entirely. If the wiper reaches the contact and you still don't get any power to the motor, something may be blocking the contact. Use a pencil eraser to clean the contacts on both the plate and the arm, and see if that cures the trouble. Or you may have a loose solder connection. Tug on the wires to see whether any come off; if they do, you'll have to re-solder them.

Flexible Flier

First, I'd like to compliment you on your fine magazine; I eagerly await each month's edition. I'm a 15-year-old racer who just loves this hobby. I have an Outrage ST stadium truck with a Novak Duster II, Futaba radio gear and a Trinity Onyx motor. I power my car with Trinity 1400 stick packs. My first question concerns the truck's chassis, which seems to flex too much. Is there any way to stiffen it, especially the shock towers? Second, how much faster is a Reedy Sonic 10-turn double than the motor I've got? Thanks!
JOHN CUNNINGHAM,
El Paso TX



Yes, John, you could stiffen your chassis and shock towers, but then you might break other parts. The Outrage ST has a certain amount of flex built into it to increase durability. If you take away that flex, something else is going to give! If the stock shock towers need to be replaced, I'd suggest you buy some G-10 fiberglass from a plastics supply store (check the Yellow Pages) and make your own. Just trace the shape of your original shock tower onto the material (don't forget to mark the holes), and cut out the new part with a hacksaw. Do this outdoors or in a well-ventilated area, and wear a painter's mask; glass dust is insidious and can cause health problems, if inhaled. Your motor choice is ambitious! Yes, the 10-turn Sonic will be faster than the 14-turn you've got now, but I would be concerned about battery life; it's doubtful that a 1400mAh sport pack would have enough capacity to sustain a 5-minute run with that motor. ■

BY DOUG MERTES

Is your car as efficient as it should be?

A 4-cell pack, stock motor and stopwatch are all that you need to gauge the efficiency of your car's rotating parts. A good stopwatch is an invaluable tool for racers; the Robic unit shown here is available through Bolink.*

THE GUY PITTING next to me at the track was truly perplexed. He told me that his car worked just fine for the first few minutes of every heat, but it would hook toward the end. "I just can't figure this one out," he said. "The rear seems to have plenty of traction, and the front steers well, but every time I let off in the turns, the car whips around like it's got front brakes!" I asked him whether his car did, indeed, have front brakes, and he looked at me as though I were some sort of alien. "No way; these cars don't have front brakes," was his incredulous reply. Nonetheless, he humored me when I asked him to spin the front tires on his car. Imagine his surprise when both wheels stopped rotating after only one or two revolutions because of the carpet hairs that had wound themselves around the front axles; his car had developed a pair of fuzzy "front brakes."

This little vignette shows how an R/C vehicle's performance can slowly deteriorate and lead to deficiencies that are only noticed when they become extreme—usually well after the damage to parts and lap times has been done. Every component on an R/C vehicle has both a limited service life and a minimum maintenance life. Take care of the pieces that make up your car when you're supposed to, and you'll find that all aspects of the vehicle's performance become much more consistent and efficient. In this installment of "R/C Doctor," I detail some simple tests you can perform to measure efficiency.

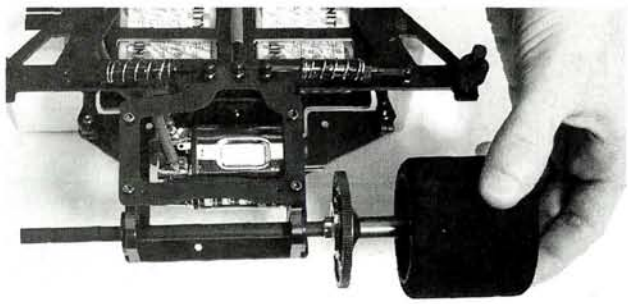
Once the test wheel is up to speed, pull the motor away and start the stopwatch. In addition to the spin-down time, you should note how the bearing stops; if it slows then stops abruptly, you've got trouble.

WHEELS, AXLES AND BEARINGS

You can feel it when a bearing starts to get crunchy, but by then, it is often too late to bring it back to like-new efficiency. However, there is a standard test to help you tell when it's time to replace, clean, or re-lube your bearings.

Put your pan car on a stand or a block of wood so that the wheels can run free, and remove the pinion from the motor. Next, install a pinion on a spare motor to use as a "driver." Using a 4-cell pack or a dooleybox, power up the motor and gently hold the pinion against the front tire to spin the wheel. Once the wheel is up to speed, pull the motor away, start the stopwatch, and measure how long it takes for the wheel to stop spinning. Pay attention to whether it stops all at once or gradually. In your pit notebook, write down the time it took to stop, and do the same test each week until you find that there has been a measurable decline in performance. It's best if you can do this test when the bearings are brand-new so you can establish a benchmark for best performance. Over time, you'll find that the bearings will start to slow down long before you can feel any difference in their smoothness. You can then take action to restore performance before your lap times go up.

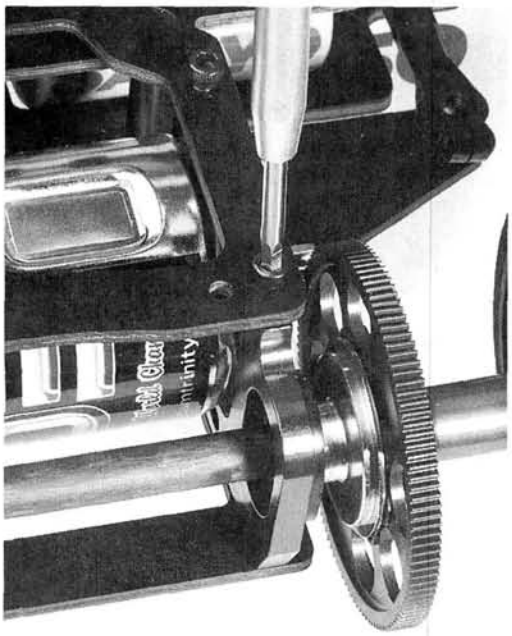
How about the back end of your car? Use a similar test. Once you've removed the pinion, the rear wheels should spin freely. If you're testing a pan car or an F1 car with a straight rear axle, this is a good way to find out how those rear pod bearings are doing. Make sure that an impact with a wall hasn't compressed the left side hub so that it's too tight against the pod bearing. You should be able to move the axle back and forth just a teeny bit—enough to allow a little movement, but not so much that you can hear it click when it moves from side to side. The axle and wheel assembly should roll smoothly and glide gradually to a stop.



Proper alignment of the pod bearings is critical to performance and bearing life. The axle should slide through the bearings with only the slightest effort.

If you find that even fresh bearings spin down quickly, check the alignment of the pod halves. Built properly, the rear pod should allow the axle to slip through the bearings easily; built improperly, the binding caused by the misalignment will

slow the rear axle. To correct a misalignment, loosen the pod side's top and bottom screws with the axle in place, then retighten the screws. Don't lock them down, and alternately tighten top, bottom, left and right screws. Once all the screws are just snug, re-check the axle; if it doesn't slide freely through the bearings, give it a wiggle until it frees up, then give the screws a final twist to lock them in.



If the rear pod halves aren't perfectly aligned, loosen the pod screws with the axle in place, then re-tighten when the axle slides freely.

OFF-ROAD EFFICIENCY

While the front wheels of a fully suspended vehicle can be tested as detailed previously, the more complex drive train requires additional care. Take a few extra minutes to remove the transmission and dogbones so that you'll be testing only the hub bearings (if you have universal-type drive shafts, you won't be able to do this). While the transmission is out of the car, use your hand-held motor and pinion to drive the spur as you did with the wheels; a properly assembled transmission with fresh bearings will freewheel for a few seconds—long enough to measure and compare with future tests.

The transmission of your off-road machine can also be spin-tested for peak efficiency. Be sure to use the same size pinion and spur on follow-up tests!

Experienced tuners and setup experts spend much of their spare time establishing "metrics," or performance thresholds, using simple tests like these. They understand that the small details can make the difference between a champagne shower and a sullen ride home in the team van. Follow their example, and you'll soon find that your car or truck is more consistent, faster and more efficient.

** Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

TEAM NOVAK SECRETS

A Site to See

At the touch of the keyboard you can learn just about everything you wanted to know about Team Novak. From defining common R/C terms to explaining how to install motor capacitors, Novak's all-encompassing website at **www.teamnovak.com** is an excellent source to help both novices and experts alike.

Download Goodies

One of the most visited spots on our website is the **Download** section. Here you will be able to download complete instruction manuals, service cards and even our ESC Profile Software.

If you want information on a particular product, take a look at our **Product Information Pages,** which give detailed descriptions of our speed controls, receivers, chargers and programming equipment to name a few.

Want to compare the specs on our speed controls? Study our comprehensive **ESC Specifications Table.** Want to know prices? See our **Retail Price List.**

Search and You Will Find

Our Q & A section is extremely informative. Under this heading, you'll find a list of helpful subjects. If you've ever needed an R/C term defined, you'll find it in our **Tech Talk** or **Glossary** section. Here we've compiled a lengthy list of terms and tried to explain them plainly and simply.

Do you need help installing or programming a Novak item? Our **How-To** section gives thorough instructions on several subjects such as **how to install Schottky diodes, how to wire dual motors and how to program a One-Touch ESC.** Our **Troubleshooting Guides** offer help on subjects such as radio glitching, overheating and loss of throttle control.

***See for yourself all that we didn't have room to include here. Visit* www.teamnovak.com.**

NOVAK ELECTRONICS, INC.
18910 Teller Avenue, Irvine, CA 92612
• (714) 833-8873 •
Advertisement *TS #49*

PRODUCT watch

Need to know what's new? What works well and what doesn't? This section is devoted to objective reviews of all R/C car accessory items. From gears and wrenches to motor brushes and shock springs; if you can use it with your R/C vehicle, you'll find it critiqued on these pages.

52
Hitec HFX Speed Control

54
Ride F1 Slicks

54
Hobbico After Run Oil

56
Progressive Suspension External Damping Control Shocks

58
Racer's Choice Carburetor Sealant

60
ABC Hobby Magic Dampers

HITEC
HFX Speed Control
HIGH FREQUENCY PHENOMENON

In the R/C car arena, Hitec* has built its reputation on basic, reliable radio gear that's well suited to the beginning or budget-minded hobbyist. Lately, though, Hitec has added to its line some products that represent a new level of performance and sophistication. Case in point: the Hitec HFX speed control. This compact, 3-wire ESC looks race worthy and rugged; let's see what it can do.

Although outstanding performance was a top goal for Hitec's designers, they also wanted the HFX to represent good value—a Hitec hallmark. Judging by the HFX's specs, Hitec appears to have succeeded. The unit can handle any motor with 10 or more turns; it has a push-button setup for trouble-free calibration; and a 20- to 120A current limiter with a finger-friendly knob helps tailor the power output to your needs. Heavy-duty 12-gauge silver wire extends from the top of the case, and a snazzy, blue heat sink with a silicone boot is attached to the FETs to provide extra cooling.

INSTALLATION

To give the unit a real workout, I decided to drop the HFX into a Tamiya TA02 sedan, along with a Trinity Sapphire motor; I figured the robust chassis and power-hungry motor would be more than enough to test the limits of the Hitec speedo. Installation was easy, thanks to the HFX's small size, long wires and universal-type connector; it fit directly into my receiver. Keep in mind, however, that the HFX does not include connectors or capacitors (which are required), and you'll need a soldering iron for installation. Once installed, it was a snap to calibrate the HFX; an LED blinks when the unit has accepted the transmitter's neutral, brake and throttle positions.

PERFORMANCE

I went out to a wide-open parking lot for a full-throttle test. The HFX is an impressive performer with smooth throttle control and powerful brakes. The current limiter's large knob is easier to manipulate than the typically smaller pots and/or knobs found on comparable ESCs. As the battery dumped and the car slowed to a crawl, full control of the steering was still possible; the HFX gives priority to the receiver and steering servo and allows you to use every last millivolt of power. When the test car finally came to a halt, I immediately dropped in another battery and ran the car indoors at a constant low speed to keep the pressure on. This partial-throttle setting gives the ESC a workout because insufficient airflow and inadequate cooling strain it; after this test, though, I found the heat sink merely warm. If the HFX ever becomes dangerously hot, TEMPFET protection will shut it down until the internals have cooled.

FINAL THOUGHTS

Since performing this test, I have run many packs through the HFX, and it has shown itself to be a rugged, reliable performer. On those merits alone, I would recommend this unit to any racer or enthusiast, but the low price of the HFX really seals the deal. Whenever low cost and high performance come together in one product, that's hard to beat.

—Greg Vogel

SPECIFICATIONS

Part no.: 41810
List price/street price: $159.99/$79.99
Cells: 4 to 10
Resistance: 0.001167 ohm
Current limiter: 20 to 120A
Wire gauge: 12
Hookup: 3-wire
Dimensions: 1.6 x 1.2 x 0.7 in.
Weight w/wires: 64gm
Frequency: 1830Hz
Forward current: 300 amps
Brake current: 100 amps
BEC: 6V
Motor limit: 10-turn
Additional features: universal receiver plug, push-button setup, FET servo lead, temperature protected

PHOTOS BY WALTER SIDAS

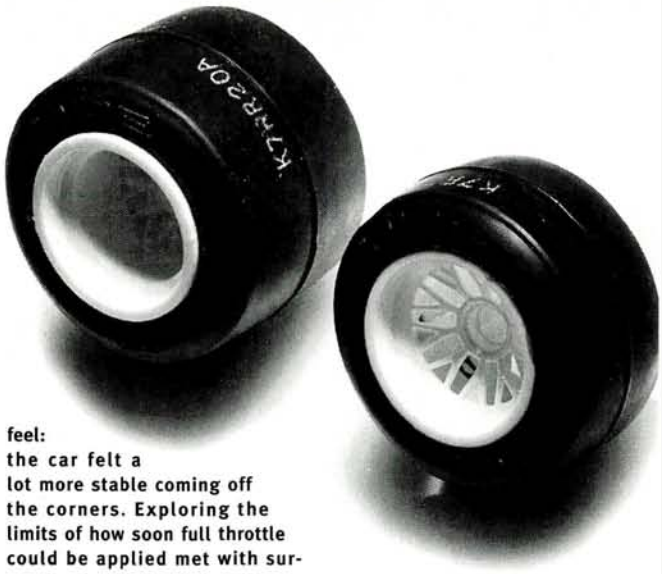


PHOTO BY WALTER SIDAS

RIDE
F1 Slicks
GRIP IT ... GRIP IT GOOD!

So you say your F1 is a real handful on a slick and bumpy parking lot? Are you tired of replacing those foam tires after every other race because there are big chunks missing from the sidewalls? Well, turn that tire truer off and pay attention!

Ride's* rubber F1 racing slicks may be just what you need. They are available in two sticky compounds—hard and soft. Hard is actually quite soft, and soft is very, very soft. Both feature Ride's "inner-mesh overlay," (i.e., these are "belted" tires). The belt is an important feature for tires with very soft compounds, because without some type of support, the tires would easily be deformed under acceleration and by cornering forces. Foam inserts are also included to help the tires keep their shape.

The rubber compound that Ride uses is so soft and sticky that the tires will actually adhere to smooth vertical surfaces (my wife got really tired of my numerous demonstrations of how they would stick to the refrigerator and the kitchen cabinets). I know, I know; kitchen appliances are one thing ... what about pavement, you ask? These tires grip asphalt in the same way that burnt tapioca pudding sticks to a pan; that kind of grip can do nothing but lower lap times.

To fully take advantage of the capability of its tires, Ride recommends a chassis setup that gives more traction to the rear wheels. This translates into a very soft setting on the rear shock, and a fairly loose friction plate. I tried this setup, and the difference is easy to feel: the car felt a lot more stable coming off the corners. Exploring the limits of how soon full throttle could be applied met with surprising results. While it was still possible to overpower the rear tires, the resulting power slide could easily be balanced with the throttle. That's not a common experience with foam tires, which have a tendency to drift through corners and are practically impossible to catch when you over-cook it. I was afraid that the excellent performance of the tires might come at the expense of excessive wear, but after several aggressive test runs with the tires mounted on my Tamiya Indy car, I found that they showed very little wear.

Ride's F1 tires won't save you if you completely blow your chassis setup, but they can certainly enhance the precision of your car's handling. With some minor tuning tweaks, you'll be dodging hacks and clipping apexes like Michael Schumacher. If your local track allows the use of rubber tires on F1s, you just might want to try a set of Rides.

—Louie Patterelli

HOBBICO After Run Oil
R/C PRESERVATION PRODUCT

The longevity of any mechanical device depends on more than just maintenance. Yes, you must also *protect* your R/C vehicles both to ensure a long useful life and to increase your fun running them! To that end, Hobbico's* After Run Oil is a new product that will help safeguard your nitro engine and help ensure a long, trouble-free life.

Surely, one of the quickest ways to ruin a perfectly good nitro engine is to leave it alone. Huh? That's right; just about the worst thing you can do is to run a nitro burner all day long and then just toss it into the corner of your garage.

Any nitro powerplant should have a good after-run oil run through it after a day's use. Some folks make up their own engine lube from various types of slippery compounds, but Hobbico has now taken the guesswork out of choosing an engine protectant.

Pour a few drops of the red, light viscosity After Run Oil into the carb inlet (set wide open) and let it circulate throughout the engine. A few turns of the crank are all it takes to protect your nitro mill. The oil prevents corrosion, oxidation or fuel-residue gum from harming the engine.

Used regularly, Hobbico's After Run Oil will help ensure that there won't be any hard-to-start, poor-running, or frozen-up powerplants to ruin your Sunday running. Not a bad deal, wouldn't you say?

—Rick Eyrich

PROGRESSIVE SUSPENSION

External Damping Control Shocks

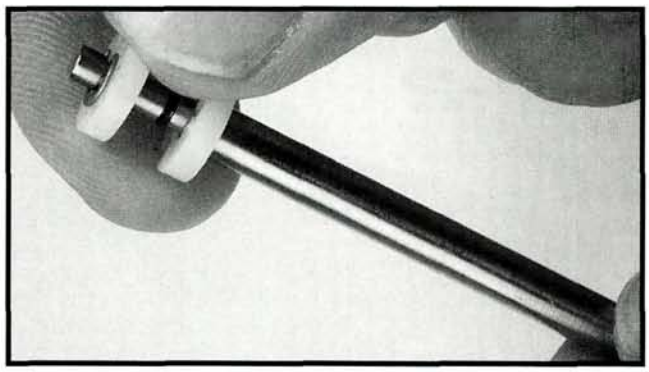
DIAL-A-DAMPING

Hard-anodized bodies, stainless shafts, precision-molded parts and aluminum top caps make the External Damping Control suspenders a class act. Except for the massive shock shaft, you would be hard pressed to tell a Progressive shock from an ordinary, take-it-apart-if-you-wanna-mess-with-it design.

Like full-scale off-road racing, R/C off-road racing is all about suspension, and suspension is all about damping. In the case of the oil-damped shocks used on R/C cars, "damping" refers to the amount of force required to push and pull the piston through the oil in the shock body. When you adjust the suspension of your off-road ride, damping changes can have profound effects. For example, very light damping can allow the suspension to react quickly to small bumps, but will probably lead to bottoming out over jumps. Heavy damping can help to handle big launches and hard landings, but at the expense of responsiveness, stability and traction.

As important as damping adjustments can be, it has always been a hassle to make them; the shocks must be removed from the car, oil coats the parts (which makes the work difficult and messy), and the results are apparent only after tedious reassembly. At least, that used to be the case. Progressive Suspension USA*—well known to full-scale off-road buffs—has introduced a new shock system that permits easy adjustment of damping without tools and without removing the shocks. Simply by turning the spring perch, Progressive's new External Damping Control shock allows the racer to choose from four damping settings. How do they do that?

The external damping technology is actually quite simple: the shock shaft is two pieces—a hollow outer shaft and a solid inner shaft fit together like the sections of your radio's antenna. Each shaft has a piston on the top end like a typical oil-filled shock. The larger, outer shaft is referred to as the "adjusting tube"; it's mounted on the "adjusting piston," which has two large holes. The inner shaft fits inside the adjusting tube and has a piston with holes of four sizes. By twisting the adjusting tube, different size holes in the fixed piston can be made to line up with the holes in the adjusting piston and thus alter damping; more force is required to push oil through smaller holes; large holes require less The adjusting tube is actuated by turning the spring perch, to which it is keyed. Detents hold each setting so your damping adjustments won't "float" as you drive.

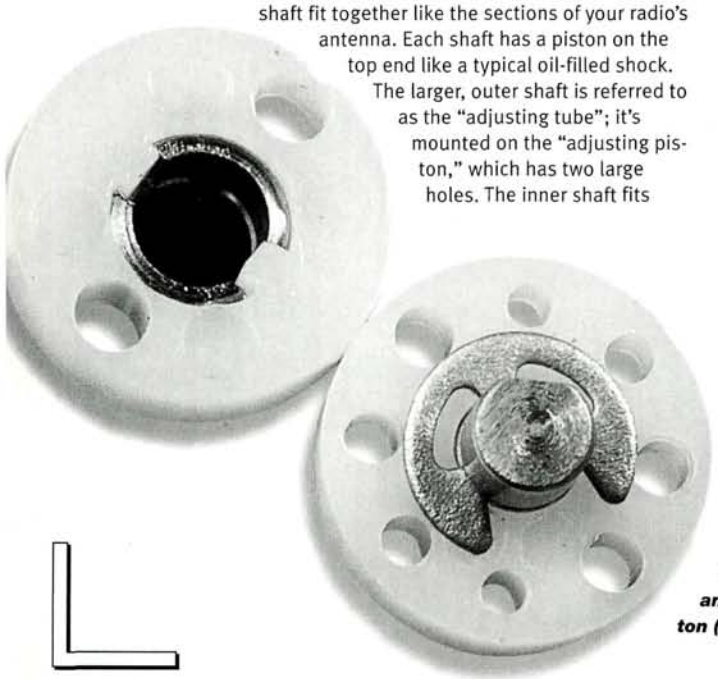


This is the heart of the External Damping Control system—a unique shaft-within-a-shaft, dual-piston design. Note the tiny O-ring that seals the inner and outer shafts.

Progressive shocks are not difficult to assemble; if you were able to build your kit's shocks correctly, you'll have no trouble building the adjustable units. I recommend the application of RCPS* Green Slime to the seals of these and any other oil-damped shocks for better sealing and less shaft friction.

One of the last steps in building the Progressive Suspension

(Continued on page 58.)



The adjusting tube and piston (left) feature a pair of large holes and rotate to select one of four pairs of holes in the stationary piston (right)—similar to rotating the cap on a can of cheese!

PHOTOS BY WALTER SIDAS

Progressive Suspension

(Continued from page 56.)

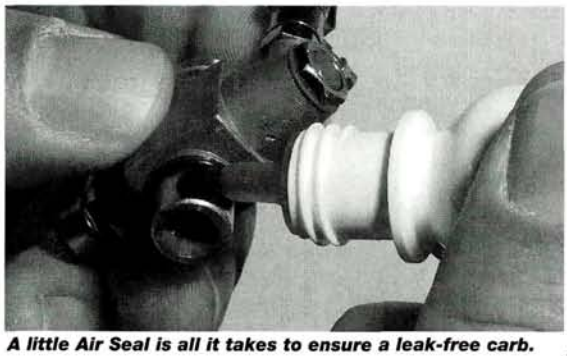
shocks is to fill them with the oil of your choice. It took me numerous tries to get exactly the right amount of oil into the shock body; there isn't any mechanism for volume compensation, and overfilling will prevent the shock shaft from fully compressing. Take the time to get it right! Once I had properly filled them, I set all the shocks to the "number one" position (least damping), installed the shocks on my RC10GT with the stock Associated springs and headed for the track.

During the first few laps, I took it a little easy so that I could get used to the way the new suspension felt. In terms of plushness, the truck seemed to perform as though it had the (excellent) stock Associated Team shocks on it. By the fourth pass, it was time to see how the new shocks would respond to some big jumps and bumpy surfaces. I found the light damping insufficient for this; the rear end slapped hard, bottoming the shocks over anything more taxing than mild landings. I pulled the truck off the track and adjusted the rear shocks to the number-three position (more damping), leaving the fronts in the number-one position; the change took only seconds. I made another run and was amazed. The truck really did handle better with the new setting. The front end stayed stable and steering remained sharp, but the back end had less bite and didn't bottom out on the jumps as it had before.

Now for the bad news. These little gems list for $59.95 a pair; multiply that by two, and you have one expensive suspension system. The loss of a few bucks is recouped, though, by savings in time and frustration, and by the possible addition of a few trophies to your collection. Since Progressive Suspension's External Damping Control shocks are so quick and easy to adjust, you'll probably try new settings more frequently, and that means you'll be more likely to get that perfect setup for a podium showing. ***—Tim Knowlton***

RACER'S CHOICE
Carburetor Sealant
BLACK MAGIC FOR YOUR CARB

Any R/C buff who is into nitro power will tell you how maddening it can be to tune a motor that isn't properly sealed against air leaks. A nitro powerplant requires precise mixing of fuel and air, and the slightest leak can turn a Sunday of fun into pull-start punishment. Racer's Choice* has a new product that will help ensure that this fate doesn't befall you!



A little Air Seal is all it takes to ensure a leak-free carb.

Air Seal Carb Sealant is a thick, black liquid that is meant to prevent the air leaks that are commonly found around a carburetor's mounting area. Normally, a small O-ring is in place to prevent leaks, but it often isn't effective enough.

That's where the Air Seal compound comes in. After cleaning the carb base and engine-mounting spigot with alcohol, apply a bead of Air Seal around the carb base. Once the sealant has set for 30 seconds, re-install the carb on the nitro powerplant.

You can fire up the engine after 20 minutes, but full cure takes an hour. The Air Seal compound remains flexible, is fuel-resistant and easily removed for maintenance. The absence of any air-leak-related trouble with the Air Seal-treated engines I have used indicates that this product does work.

In addition to its leak-preventing properties, I found this product useful in other ways. The natural engine vibration that occurs on nitro cars and trucks will loosen chassis nuts, bolts and screws, suspension bits and even carb-mixture adjusters. A drop of Air Seal added during assembly will act as a soft locking compound to prevent them from loosening. I've also found this product safe for use on plastic-chassis screw holes (plastic can be melted by many other kinds of thread-locking liquids).

When used properly, the Air Seal carb compound does everything Racer's Choice promises. *—Rick Eyrich*

PHOTOS BY WALTER SIDAS

ABC HOBBY
Magic Dampers
MAKE BUMPS DISAPPEAR

Bigger isn't always better. In the case of touring cars, "faster" often means "smaller." Since the first sedans hit the market, the widths of tires and chassis have decreased as performance has increased. ABC Hobby* has taken a page from the "smaller is better" handbook to create Magic Dampers, which feature short, low-volume shock bodies to better suit the short-travel needs of touring cars.

The ABC dampers appear to be of high quality; the polished-aluminum shock bodies have a smooth, clean finish and are equipped with red-anodized caps. All the accompanying plastic parts are translucent red; these shocks look cool and will be real eye catchers on your sedan. ABC also includes a full set of tuned springs—nice touch! The springs are anodized in black, blue and gold for easy pairing.

ASSEMBLY

The assembly "instructions" are actually just an exploded-view diagram with text in Japanese. Assembly is straightforward, however, and only the most rank beginner could be expected to experience any difficulty.

The shock's small size means that very little oil is required (none is included). The O-rings and Teflon washers were already in place in each shock body, so I only had to install one O-ring around the threads at the top of the shock body where the cap screws on. The kit comes with a single notched piston for each shock; unless you wish to drill your own holes in the pistons, using oils of varied viscosities is the only way to adjust damping.

Three spacers of different sizes are included to fine-tune ride height. Instead of the usual rubber bladder, ABC use what they refer to as "magic foam" for volume compensation. As the shock is compressed, the oil displaced by the shaft is forced into the foam. As the shaft exits, the oil is pulled back into the shock body. The included 5.8mm stainless-steel pivot balls allow the shocks to be attached with screws instead of being snapped on and off threaded pivot balls. For those who frequently remove their shocks for oil changes, this should mean longer life for the plastic ball ends.

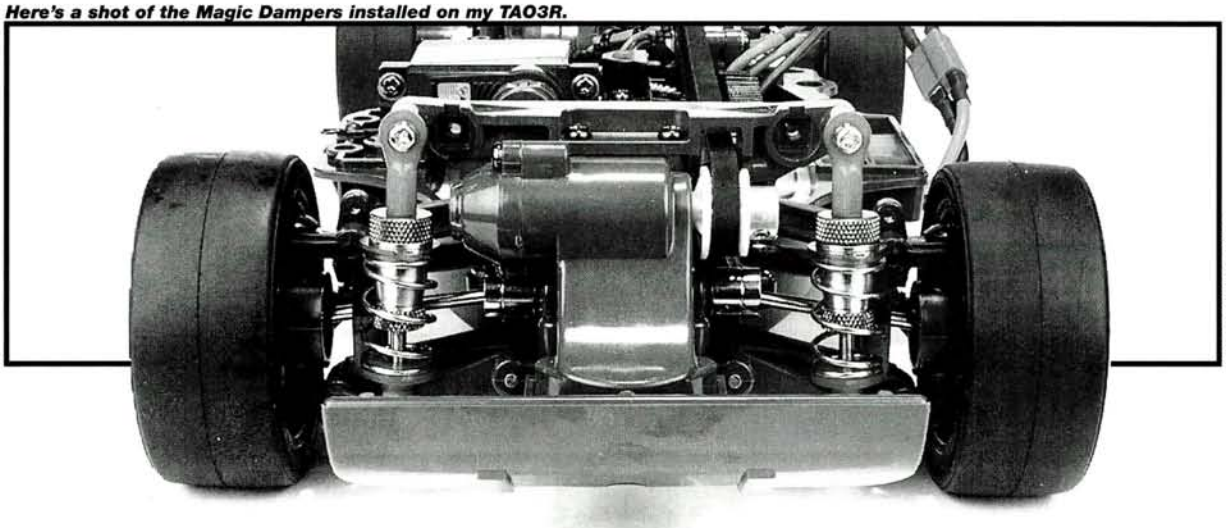
PERFORMANCE

I installed the shocks on my Tamiya TA03R for testing. I had to put a spacer behind the lower pivot ball for the ball end to clear the suspension arm, but the ABC units were otherwise a drop-in installation. I set up the dampers with the supplied gold springs, filled them with 70WT Integy shock oil, and hit the track.

The Magic Dampers did a fine job of soaking up the bumps, and handling through turns was predictable and smooth. The tuned springs and preload spacers allowed me to easily dial in my car just the way I like it without a lot of fuss. In all, this is a fine replacement shock or performance upgrade for any sedan

—Jim Napier

Here's a shot of the Magic Dampers installed on my TA03R.



PHOTOS BY WALTER SIDAS

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

thrash TEST
1/10 scale electric

Associated RC10B3

by Greg Vogel

Quick! Name the most successful R/C buggy ever. Did you say Associated RC10? If you did, you're right on the money. Unless you're new to the hobby or have been in cryogenic suspension since the mid-'80s, you'd have to agree that the RC10 series of buggies has long been a dominant force on racetracks here in the U.S. and around the world.*

Whenever Associated shakes up that winning formula, it's news. Remember the stir caused by the erstwhile "Stealth" buggy and the fervor that surrounded the release of the B2? Well, it's happening again with the RC10B3—Associated's latest take on its successful RC10 platform. With its innovative new suspension and many subtle but significant changes, the B3 might be the most highly anticipated release of 1998. Is it worth the wait? Keep reading!

PHOTOS BY WALTER SIDAS

The Latest KillerB

The Team Associated RC10B3 looks almost too good to drive. I have seen a tear come to many a driver's eye when a pretty new car hits the track; if you don't like the dirt, stay home and play video games!

KIT FEATURES

• **Chassis.** At first glance, you'd be hard pressed to spot the changes made to the B3's molded main chassis; it retains the center-channel, integral-rear-bulkhead design of its predecessor. A closer look, however, reveals two small holes in the bulkhead that are provisions for an optional swaybar.

As with the B2, the battery pack sits in the foam-padded channel along the center of the chassis. The battery channel is longer than the pack itself, and that allows the insertion of foam spacer blocks to position the pack. By varying the position of the spacer blocks and the battery, the pack's weight can be used as a tuning aid (see "Building and Setup Tips," page 67). The center channel is the lowest point of the chassis, and the sides rise from it at a shallow angle. The raised sides increase cornering clearance and will reduce drag if the chassis bottoms out on the track. An aluminum nose plate and rear chassis plate are bolted to the plastic main chassis; the nose plate is the same as that of the B2, but the rear chassis plate is new, and it's wider to better protect the motor.

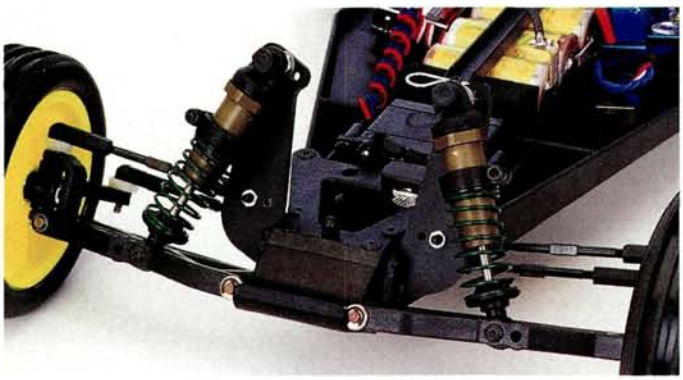
• **Suspension.** The B3's front and rear suspension arms are all new and feature a unique "Quadra-symmetric" design. The tongue-twisting name describes a simple concept: all four suspension arms are of the same length. Another level of symmetry can be seen in the location of the hinge pins on the chassis: the front and rear hinge pins pivot on the same plane. The goal of the Quadra-symmetric system is to provide a more stable ride and improve rough-track handling. Does it work? Only a track test will tell.

The suspension arms themselves are molded of a rigid composite, and the front arms feature molded-in ball ends to accept optional swaybars. The rear suspension arms are fixed to the chassis by individual molded mounts that provide 3 degrees of anti-squat and 3 degrees of toe-in on each side. If you plan to run the buggy over very rough ground, Associated recommends the addition of a washer between the rear of each mount and the chassis to reduce anti-squat to 1.5 degrees; this should provide more controlled acceleration under bumpy conditions. At the other end of the rear suspension arms, new hub carriers with two camber-link positions are in place. Spacers are used to position the hubs on the hinge pins; altering the position of the spacers and hubs allows the wheelbase to be adjusted to sharpen handling or increase stability.

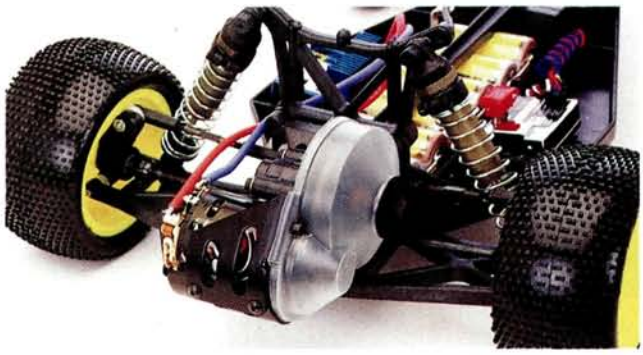
Even the best suspension designs are valueless if mated with sub-par shock absorbers, but Associated needs never

specs

SCALE	1/10
LIST PRICE	$320—Team Kit
DIMENSIONS	
Length overall	15 in.
Chassis length	14.75 in.
Wheelbase	10.5 in.
Width (F/R)	9.625/9.75 in.
WEIGHT	
Gross, RTR	3 lb., 4 oz.
CHASSIS	
Type	Molded tub
Material	Composite
DRIVE TRAIN	
Type	Sealed, 3-gear Stealth tranny (2.4 ratio)
Primary	Pinion/ spur
Transmission	MIP CVD drive shafts
Differential(s)	Adjustable ball diff
Slipper clutch	Large-diameter friction slipper
Bearings/bushings	Sealed ball bearings
SUSPENSION (F/R)	
Type	Independent lower arm w/ adjustable upper link
Damping	Hard anodized, oil-filled shocks
WHEELS (F/R)	
Type	One-piece
Diameter	2.2 in.
TIRES	
Front	Pro-Line 4-rib M2
Rear	Pro-Line Holeshot M2
ELECTRICS	
Motor, battery, ESC	Not included



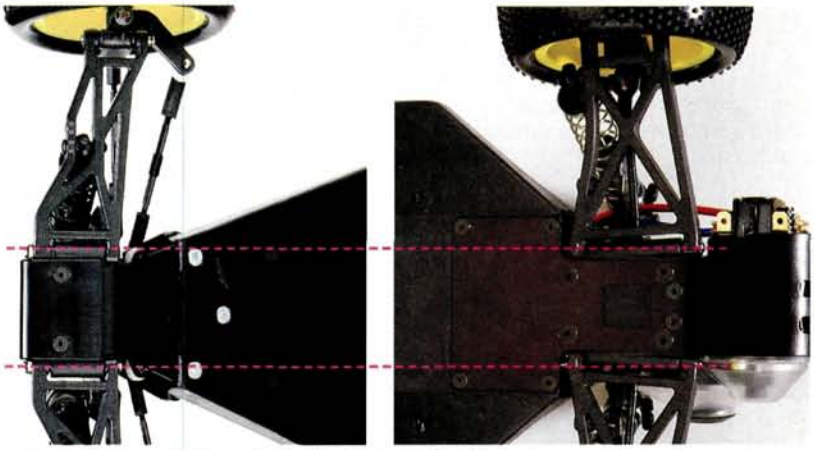
New suspension arms, steering blocks, shock tower, and 2.2-inch-diameter rims grace the B3's front end.



A new, larger-diameter slipper pad assembly resides beneath the gear cover. Pro-Line tires come stock on all four corners of the Team version B3.

worry about that; the Team shocks remain among the best in off-road. With hard-anodized, Teflon-coated shock bodies, precision seals and high-quality shafts, the Team shocks are ready for any level of competition. Kit-supplied silver rear and green front springs finish off the B3's suspension assembly.

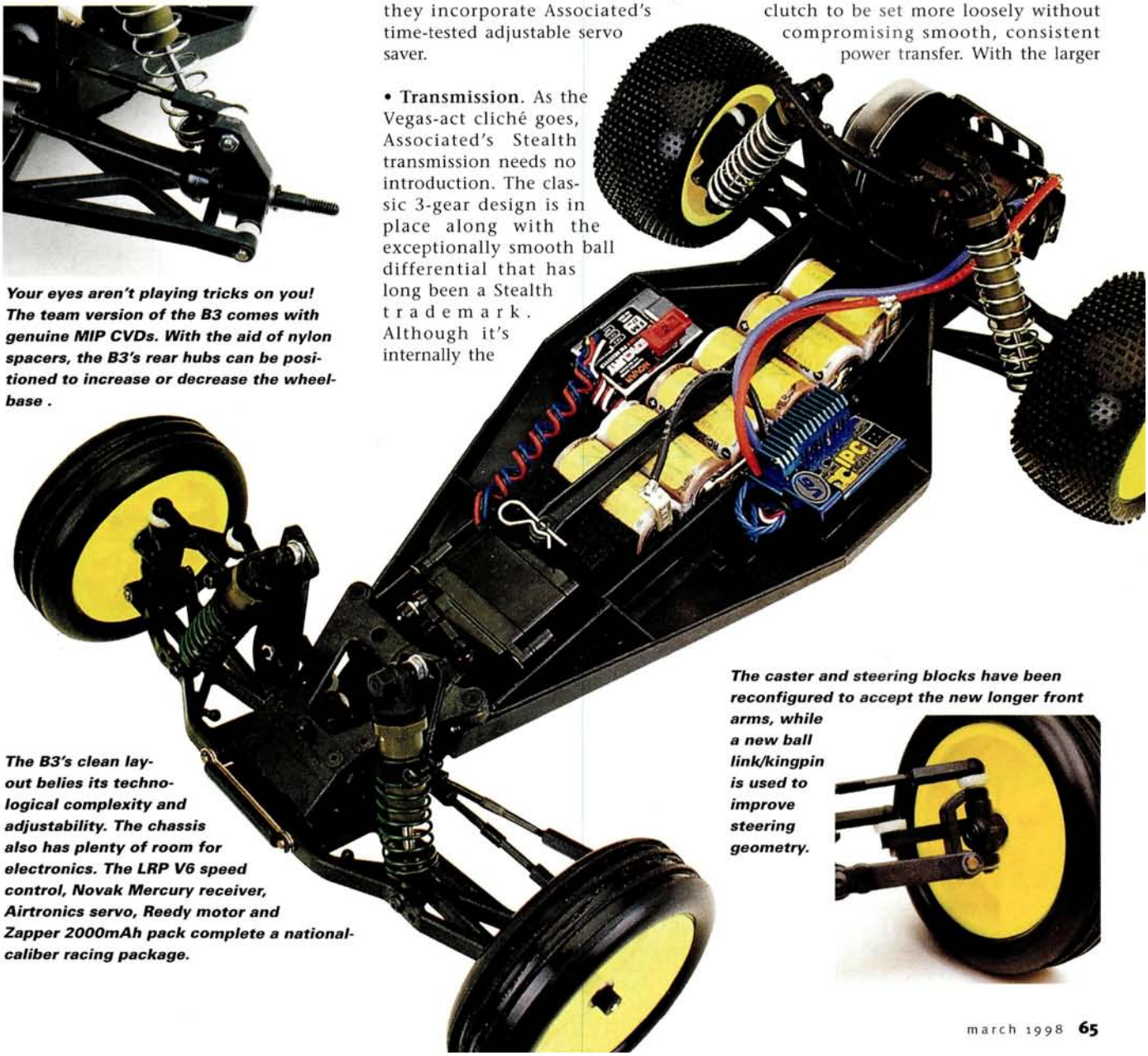
• **Steering**. Associated spent a lot of time revising the B3's steering components, and the changes are significant. The kingpins, caster blocks, steering blocks and front shock tower are all redesigns. The new shock tower has three shock-mounting holes and an additional camber-link hole (an option not offered by the B2). The new kingpins feature integral ball studs for camber-link attachment. This design places the camber link directly over the steering block's pivot; this simplifies the assembly and optimizes suspension geometry. To complete the steering system, the B2's bellcranks have been carried over to the B3. These units provide two Ackerman positions to adjust the aggressiveness of the B3's steering, and they incorporate Associated's time-tested adjustable servo saver.



An imaginary line traced through the front hinge pins finds the rear hinge pins on the same plane; this, along with the same-length front and rear suspension arms, is what Associated refers to as "Quadra-symmetric" suspension.

Your eyes aren't playing tricks on you! The team version of the B3 comes with genuine MIP CVDs. With the aid of nylon spacers, the B3's rear hubs can be positioned to increase or decrease the wheelbase .

• **Transmission**. As the Vegas-act cliché goes, Associated's Stealth transmission needs no introduction. The classic 3-gear design is in place along with the exceptionally smooth ball differential that has long been a Stealth trademark. Although it's internally the same as the B2, the B3-specification tranny does feature a new slipper clutch. The slipper-pad assembly's diameter has been increased by 15 percent and allows the clutch to be set more loosely without compromising smooth, consistent power transfer. With the larger



The B3's clean layout belies its technological complexity and adjustability. The chassis also has plenty of room for electronics. The LRP V6 speed control, Novak Mercury receiver, Airtronics servo, Reedy motor and Zapper 2000mAh pack complete a national-caliber racing package.

The caster and steering blocks have been reconfigured to accept the new longer front arms, while a new ball link/kingpin is used to improve steering geometry.

effectively. The new slipper should help the B3 cope better with rough tracks on which a smooth clutch can make or break rear traction.

PERFORMANCE

I completed my B3 just in time for the weekly club race at Long Island Raceway, so I decided the B3 would receive a trial by fire—no secluded test runs for me! The Long Island track is a well-maintained blue-groove venue with long straightaways and as many sweeping turns as there are 180-degree head-turners. Although primarily a horsepower track, its technical sections demand the most of driver and machine. A triple jump is either perfectly placed or in the worst possible spot, depending on your skill; in the middle of a short stretch between hairpin turns, the triples rewarded drivers who could quickly line up their machines for a clean run and wreaked havoc with those who could not. Taken off-camber, a run at the triples guaranteed a tumble into the boards! A vigorous whoop section was enough to shake any car off-line but made A-main contenders out of those who could get through smoothly.

The first round of qualifiers went off earlier than I anticipated, leaving me with a single practice run to base my setup decisions upon. Like other buggies competeing that day, the B3 had trouble coping with the extremely hard, slick track surface. Driving on linoleum would have been easier! I was counting on using my first heat to gain more setup insight, but disaster struck; I missed the first qualifier because I was put in a truck heat instead of a buggy heat. There was tension in the pits as I tried to figure out a setup after so little track time; even the advice of other racers was questionable, as no one had yet

Interview: Cliff Lett

EVOLUTION OF THE RC10B3

R/C Car Action: How long after the initial success of the RC10 did you begin to work on a follow-up car?
Cliff Lett: Concepts and theories were tossed around on new suspension geometries and components back in 1989. Some of your readers may remember seeing photographs in *Car Action* of wacky suspension designs where there were long arms, swept arms, even front ends turned around; these were some of the attempts that led up to the B2.

RCCA: What happened to these concept cars? Why didn't they reach production?
CL: Those designs would work only on some tracks. Associated was in search of a car that would perform well in any condition.

RCCA: Which designs or advances originated with the concept vehicles?
CL: A version of the Worlds Car and the RC10T were released. This gave light to another interesting dilemma that needed attention: transmission design.

RCCA: Why was there a need to change the well-received Stealth tranny?
CL: The buggy and trucks had two different ratios that suited their individual needs, but we wanted to simplify them to reduce the parts count for the RC10 line. We were able to find the perfect ratio that would work in both—2.4:1.

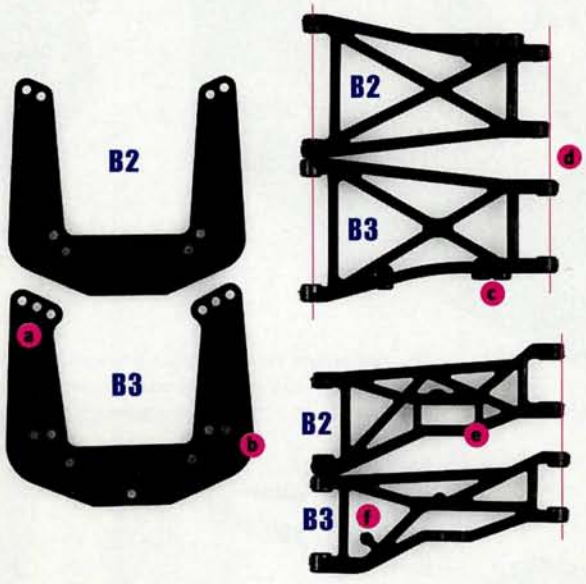
RCCA: So, armed with a new transmission design and the data accumulated from the concept studies, the next logical step was a new buggy?
CL: Yes, the B2 was next! The B2 featured longer suspension arms, a new composite chassis and a new tranny. Associated was pleased that the B2 worked better than its predecessor, but of course, we still went on with testing, and that resulted in the release of the B3.

RCCA: Our editorial staff drove the B3 and all agreed that its new Quadra-symmetric Suspension makes it handle extremely well. Where did the idea for the suspension system come from?
CL: Gut feeling! For a long time, I believed that the suspension arms should be of equal length and extend from the same plane, so the parts were designed and tested on the computer for flex and stress. Also, a new steering-carrier assembly was designed to replace the one that we have been using since the first RC10. Associated wanted to offer drivers a versatile buggy that could be put together and run well on any track. We also tried to give the best deal possible for the money.

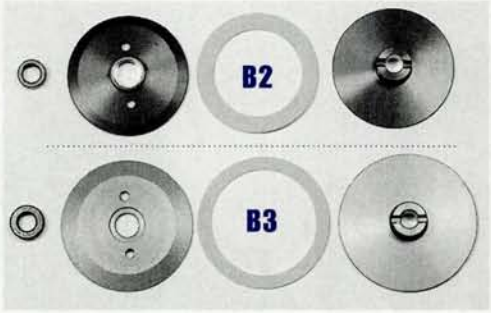
RCCA: After driving the B3, I'd say you succeeded! Thanks for all that interesting information, Cliff.

B2, B3, What's the difference?

To give you a better look at the differences between the B2 and the B3, we've paired their components for a side-by-side comparison.



The increased number of holes on the B3 shock tower allows more options for upper shock (a) and camber-link position (b). The rear arms have been subtly changed: there is one less shock-position hole (c) and the B3 arm is ⅛ inch longer than the B2 unit (d). The new front arms are also longer (e) and feature molded pivot balls for use with the optional swaybar (f).



The new slipper has a larger diameter pad that allows a looser setting without compromising consistency of operation. The plates were also altered to fit the pad, and a capture ring was added to prevent the slipper pad from expanding.

Significant changes were made to the hub and steering-block assemblies. The rear hub's pivot point has been moved farther outboard to accommodate the new, longer arms. Up front, the pivot ball and kingpin have been combined, and the steering blocks have been redesigned to accommodate them.

PAVIDIS BUILDING & SETUP TIPS

The RC10B3 is Associated's easiest build yet; it doesn't require any hand-fitting or modification along the way to completion. The manual's suggested starting setup should deliver capable handling on most tracks, but a few tips from the factory fast guys can never hurt! To that end, Mark Pavidis supplied us with his personal tweaks for the B3.

Mark: The basic setup has proven to work well on a variety of tracks, so try it first. If it doesn't work, then change your tires. Tires should almost always be your first change when you're getting the car hooked up. Obviously, you'll sometimes have to make other adjustments, and the following setups will help guide you to a perfect setup.

BUMPY, LOAMY TRACKS

FRONT SUSPENSION
Block carrier: 30 degrees
Ride height: arms level
Steering block: standard
Camber: -2 to -3 degrees
Anti-roll bar: none
Toe-in/out: 0 degrees

FRONT SHOCKS
Standard
Body: .89
Limiters: inside/outside—none
Oil: 30W
Piston: no. 1
Shaft: .71
Spring: green
Tower position: outside
Arm position: inside
Camber position: outside

REAR SUSPENSION
Suspension mounts: 3-0
Wheel hub: standard
Ride height: universals level
Anti-squat: standard
Camber: -2 to -3 degrees
Anti-roll bar: none
Hub placement: middle

REAR SHOCKS
Standard
Piston: no. 1
Oil: 25W
Limiters: inside/outside—none
Spring: silver or green
Tower position: middle
Arm position: outside
Hub camber position: inside
Inboard camber position: outside

OTHER
Tires: front—Pro-Line* 2.2 M2 with foam
rear—Pro-Line Bow Tie M2 with foam
Wheels: one-piece
Chassis: standard
Motor: 11x2
Pinion: 19
Spur: 81
Drive shafts: MIP CVDs
Slipper: standard
Battery placement: rear

BLUE-GROOVE TRACKS

FRONT SUSPENSION
Block carrier: 25 degrees
Ride height: arms level
Steering block: standard
Camber: -2 degrees
Anti-roll bar: thin
Toe-in/out: 0 degrees

FRONT SHOCKS
Standard
Body: .89
Limiters: inside/outside .060/none
Oil: 35W
Piston: no. 1
Shaft: .71
Spring: green
Tower position: middle
Arm position: inside
Camber position: outside

REAR SUSPENSION
Suspension mounts: 3-3
Wheel hub: standard
Ride height: universals level
Anti-squat: standard
Camber: -2 degrees
Anti-roll bar: thin
Hub placement: standard

REAR SHOCKS
Standard
Piston: no. 1
Oil: 30W
Limiters: inside/outside—.030/none
Spring: silver
Tower position: middle
Arm position: outside
Hub camber position: inside
Inboard camber position: inside

OTHER
Front tires: Pro-Line M3 with foam
Rear tires: Pro-Line Square Fuzzie M3 with foam
Wheels: one-piece
Chassis: standard
Motor: 11x2
Pinion: 19
Spur: 81
Drive shaft: MIP CVDs
Slipper: standard
Battery position: middle

WHEN TO USE THE OPTIONAL SWAYBARS
- If the front end has too much traction or feels darty, adding the front swaybar will reduce traction and thus remove steering.
- If you want to add steering, install the rear swaybar.
- The swaybars should be used only on smooth tracks.
- *Take the time to make sure the swaybar pivots freely, as binding can hamper its operation.*

likes

- Excellent instruction manual and setup guide.
- Stealth tranny and Team shocks are as smooth as ever.
- Team Kit includes genuine MIP CVDs and Pro-Line M2 tires.
- Friendly and forgiving to drive.

dislikes

- Servo-saver spring is too stiff.

THE COMPETITION

	Losi DOUBLE-X 'CR'	Associated RC10B3	Schumacher FIREBLADE 2000
Wheelbase	10.625 in.	10.5 in.	10.717 in.
Width (F/R)	9.3 in.	9.625/9.75 in.	9.85 in.
Weight	3 lb., 8.5 oz.	3 lb., 4 oz.	3lb. 4 oz.
Diff type	Ball	Ball	Ball
Chassis	Stiffezel	Composite	Fiberglass
List price	$349.95	$320	$279.95
Available at*	$185.99*	$178.99	$174.97
Reviewed in	11/96	3/98	11/97

*Prices vary with location.

seen a B3, much less driven one.

My second heat was much the same as my practice run: I had little rear traction. Drivers running the B2 tipped their shock secrets to me: 35WT Associated oil front and rear and number-one pistons all the way around. Relying on instinct, I also moved the front shocks to the inside holes on the shock tower and went to the outer-hole camber-rod position in the rear. Like all the competitive racers that day, I also added traction compound to the tires to combat the track's slick surface. The rest of the car was unchanged as I emerged from my pits to race the third qualifier.

Absolute success! I was quickly able to settle into a groove and put in some fast, consistent laps. Thanks to the pounding of the 4WD and truck heats, potholes soon dotted the track,

(Continued on page 198)

FACTORY OPTIONS

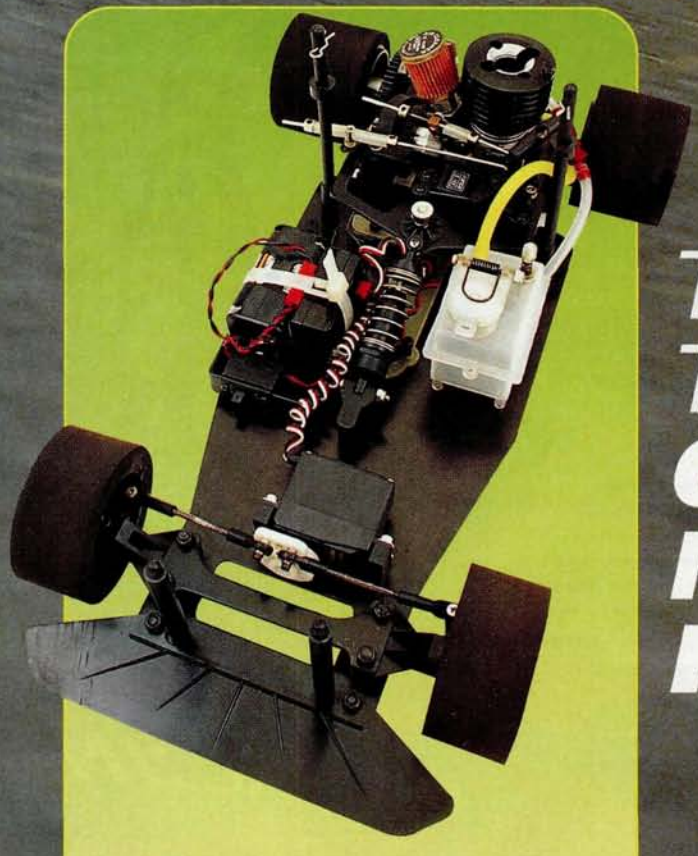
CARBON-FIBER-COMPOSITE PARTS
- Standard chassis—9199.
- Front suspension arms—9108.
- Front top plate—9131.
- Standard battery strap—9229.
- Rear suspension arms—9258.
- Rear shock strut—9271.
- Transmission brace—9381.
- Ball-bearing, right side steering—9162.
- Front shock strut (laminated carbon fiber)—9143.
- Rear suspension mounts—9266 (2 degrees toe-in/3 degrees anti-squat), 9268 (3 degrees toe-in and zero anti-squat).

OTHER PARTS
- Aluminum wing mounts—6193.
- Unobtanium shock shafts—6416 (1.32 inches), 6417 (1.02 inches), 6418 (0.71 inches).
- Front carrier block (25 degrees caster)—7212.
- Front anti-roll bar kit—9104.
- Rear anti-roll bar kit—9215.

YOU'LL NEED

- 2-channel radio
- ESC
- Motor
- Battery
- Pinion
- Paint for the body

thrash TEST
1/10 scale gas

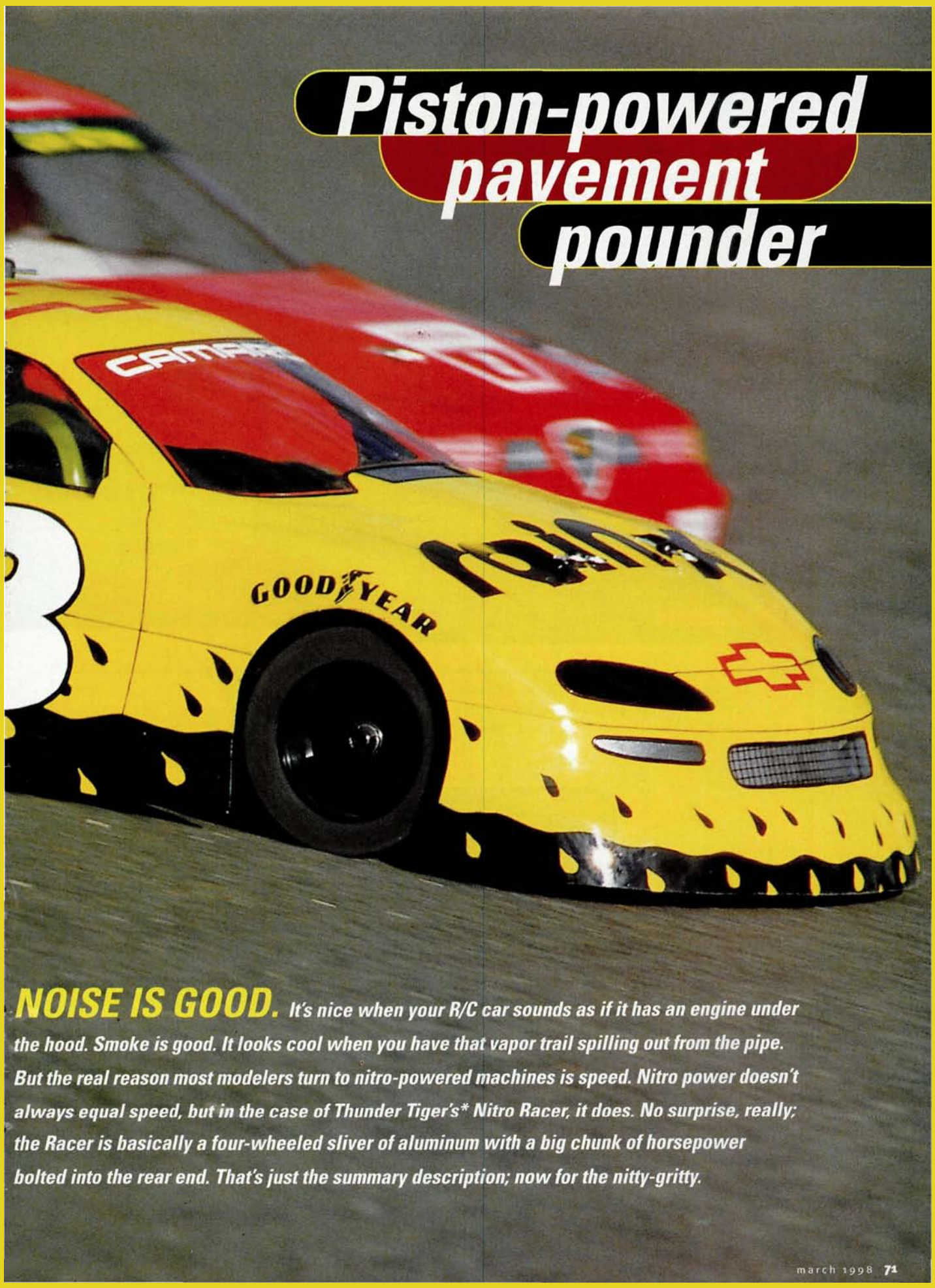


Thunder Tiger On-Road Nitro Racer

by Peter Vieira

PHOTOS BY WALTER SIDAS

Piston-powered pavement pounder

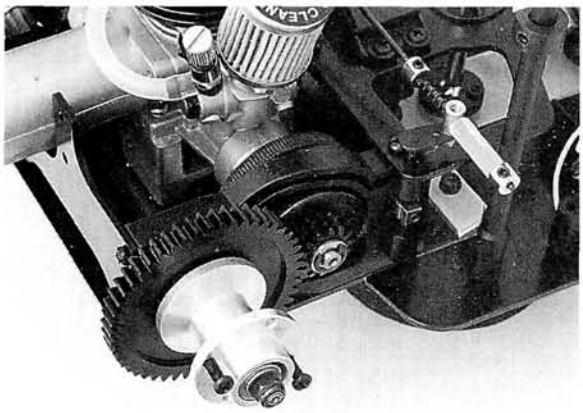


NOISE IS GOOD. *It's nice when your R/C car sounds as if it has an engine under the hood. Smoke is good. It looks cool when you have that vapor trail spilling out from the pipe. But the real reason most modelers turn to nitro-powered machines is speed. Nitro power doesn't always equal speed, but in the case of Thunder Tiger's* Nitro Racer, it does. No surprise, really; the Racer is basically a four-wheeled sliver of aluminum with a big chunk of horsepower bolted into the rear end. That's just the summary description; now for the nitty-gritty.*

KIT FEATURES

Because the Racer spills out of the box virtually assembled, there's really not much kit action here. If you're up to the challenge of mounting foam tires, slipping on the wheels, installing the radio gear and painting the body, you're in. After an hour or so of chassis setup, you essentially have a classic pan-car layout. The Pro-12 BZX engine dominates the rear of the car. It's a feature-packed mill with a paper element air filter, a substantial heat-sink head, dual crank bearings, and a high-quality pull-start mechanism. A unique mini-pipe connects directly to the engine's exhaust port and directs exhaust gases out the car's rear. The engine is bolted into a rear pod attached to the chassis via a T-plate and pivot balls. The pod's motor plate is aluminum; its side bulkheads are plastic. To make room for the engine's pull-starter, the left bulkhead is heavily relieved, while the right one houses the brake mechanism. It's a unique system; a rod is attached to a cam, which moves a single brake shoe against the clutch bell. The brake shoe slides back and forth in the right bulkhead like a piston and retracts positively for no-drag running. The T-plate that springs the pod is fiberglass and has a couple of holes for tweak screws; however, the manual doesn't actually mention putting screws in there.

There's room to spare on the Nitro Racer's aluminum-plate chassis.



Aluminum hubs are used at both ends of the steel rear axle; the right hub incorporates a ball differential. The brake cam is visible just ahead of the clutch bell. A piece of stock fuel tubing replaces the stock brake spring for a more positive brake feel.

In the usual pan-car fashion, the motor directly drives the bearing-supported rear axle via a spur gear, which is also the primary component of a ball differential. Aluminum hubs at each end of the axle have been drilled to accept standard 1/10-scale pan-car wheels. Thunder Tiger supplies black-nylon wheels and unmounted foam donuts. To mount the tires, I recommend that you use a Kimbrough* tire-mounting horn and contact cement or HPI's* tire-mounting tape. The front wheels are also 1/10 size, but they don't accept the usual 1/8x5/16 bearings; for this metric car, 11x5mm bearings are supplied.

Not surprisingly, both the front and rear suspension systems are also tried- and-true pan-car

specs

SCALE 1/10
LIST PRICE $299.99

DIMENSIONS
Length overall 19 in.
Wheelbase 11 in.
Width (F/R) 8/8 1/2 in.

WEIGHT
Gross, RTR 2 lb., 13 oz.

CHASSIS
Type Pan
Material Aluminum

DRIVE TRAIN
Type Direct drive
Primary Clutch bell/spur
Transmission None
Differential Ball
Bearings/bushings Bearings

SUSPENSION (F/R)
Type Coil springs/ Coil-over shock
Damping None/oil

WHEELS
Type One-piece plastic
Dimensions (DxW) 1 1/8x1 3/4/1 1/8x2in.

TIRES
Front/rear Foam

POWERPLANT
Engine Thunder Tiger Pro-12BZX
Pipe Integral expansion muffler
Carb Rotary

YOU'LL NEED

- **Fuel.**
- **Glow-starter.**
- ***Contact cement or tire tape.***
- **Paint for Lexan body.**
- **Receiver battery box.**
- **2-channel radio with two standard servos.**
- **12 AA batteries.**

BUILDING & SETUP TIPS

BUILDING

Because Thunder Tiger has done much of the Nitro Racer's assembly for you, there isn't much left for me to offer building tips on! However, there's always somethin'...

■ The manual suggests that you mount the tires with CA. This will work, but I prefer to mount my tires in a way that will allow me to reuse the rims. Contact cement, R/C-specific foam-tire glue, or HPI's tire tape all work well and will allow you to reclaim the rims after the tires become worn.

■ Adjust the brake carefully. You don't want the brake shoe to drag on the clutch bell as the car runs; the plastic brake shoe will melt in a hurry if does, leaving you with the dangerous mix of a very fast car and no brakes.

SETUP

■ To get the best handling from your Nitro Racer, install screws in the tweak holes on the T-plate; I found that 3mm motor screws work nicely. Thread in the screws until each just touches the chassis with the T-plate level. From here, you can adjust the screws until the car turns left and right equally well without hooking or pushing; for instance, if the car spins easily when turning left, you might loosen the right screw one turn and tighten the left screw one turn.

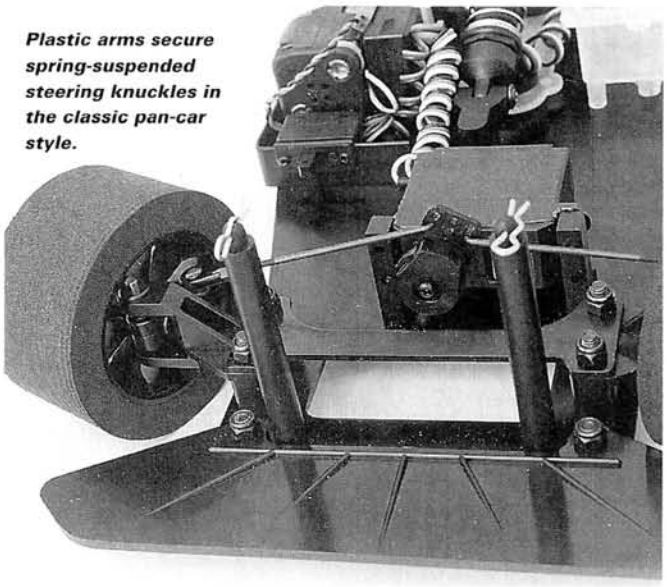
■ Trim out the rear-bumper area of the body. Left intact, this area tends to trap air, causing lift, which leads to a "light," spin-prone rear end. The Nitro Racer feels much more locked in with this simple mod.

■ Use heavy grease on the damper disks; a good chunk of the car's total weight is in the rear pod, and it requires plenty of damping for good performance.

designs. At the front of the car, small plastic steering knuckles are supported by coil springs and are held to the chassis by molded arms. The rear of the car is more complex. An oil-damped, coil-over shock is used to control rear ride height and absorb jolts, while the T-plate's torsional flex is controlled by a pair of damper disks that ride on the engine pod's aluminum top plate.

A 2mm-thick aluminum main chassis ties all the components together, leaving only the installation of electronics to complete the car. A molded tray holds the battery box (included with your radio) and the receiver, and the steering servo is secured by molded posts. Thunder Tiger supplies a servo-saver and universal spline adapters, but I opted to replace the stock unit with a heavy-duty Kimbrough servo-saver. The throttle servo is mounted to the top plate of the rear pod, and this allows it to pivot on the T-plate with the motor. The servo is positioned for easy linkage installation—the included Z-bend links make a straight run to the carburetor and brake; no bending required.

As with any R/C car, it is the body that really brings the machine to life. Thunder Tiger supplies a crisply molded Camaro shell from Parma, complete with Rain-X decals. With a quick run under the airbrush—courtesy of Greg Vogel—the Nitro Racer was ready to roll.



Plastic arms secure spring-suspended steering knuckles in the classic pan-car style.

likes

- Inexpensive.
- Very fast.
- Simple, familiar, easy-to-maintain design.
- Accepts standard 1/10 rear wheels.

dislikes

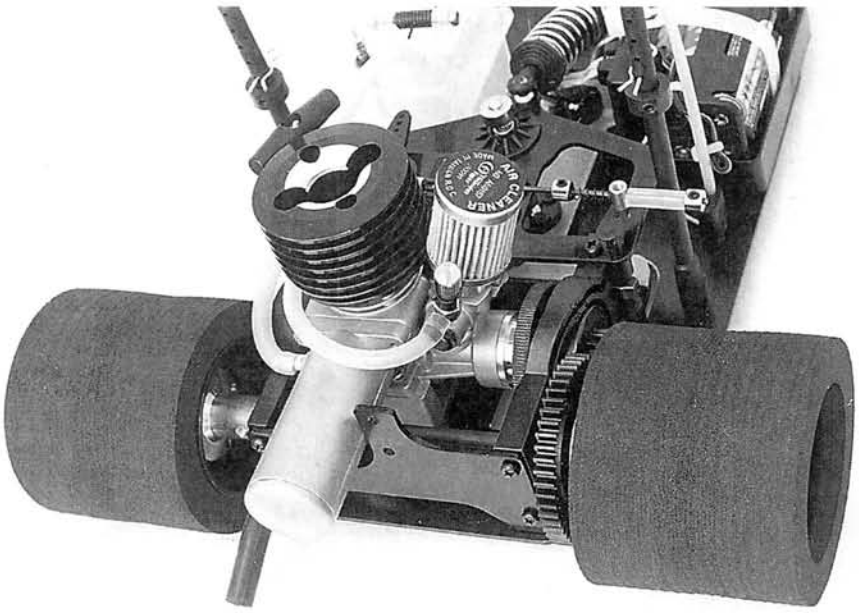
- Short tire life.

TEST GEAR

I chose to control the Racer with my trusty Futaba* 2PCKA radio, an excellent unit for reliability and value. To handle steering and throttle duty, I used the included R112JE receiver and 5148 servos and found their standard-size cases to be an ideal fit with the kit's servo-mounting locations. Dynamite* Blue Thunder 20-percent nitro fuel filled the tank, and a Hobbico* glow-starter provided the juice to get the glow plug up to temperature. Time to run!

PERFORMANCE

I headed to the local university parking lot for testing. Classes weren't in session, so the lot was free of all autos except my Thunder Tiger and a single, decrepit Dodge Omni (I'll probably hit it). I was confident that it would take only a few tugs of the Pro-12 BZX engine's pull-starter to fire up the Racer, based on previous experience with this engine. After making certain that the carb was well-primed, I gave a single yank and had the mill up and running. After an initial itchy-trigger break-in period, I let the engine sing. It's fast! Because there is very little mass to be brought up to speed, acceleration was nearly instantaneous. Handling was predictable, with a slight tendency to oversteer, although at top speed the car is just too fast to handle anything more taxing than wide, sweeping turns. Aggressive direction changes are also very hard on the tires. Combine soft foam with rough pavement, and you've got a recipe for short tire life. Slow down, then turn! I suspect that most hobbyists who give the Nitro Racer a try will be less interested in turning and more interested in making ballistic, straight-line speed runs; this is where the car truly shines. It might be more accurate to say this is where the *engine* really shines; it's the star of the show, stealing the limelight with its easy starting, gobs of horsepower, and wide, friendly powerband.



The muffler emerges directly from the exhaust port and vents fumes away from the rear wheels. The 12-Pro BZX thumper is a powerful unit and includes the paper-element filter shown here.

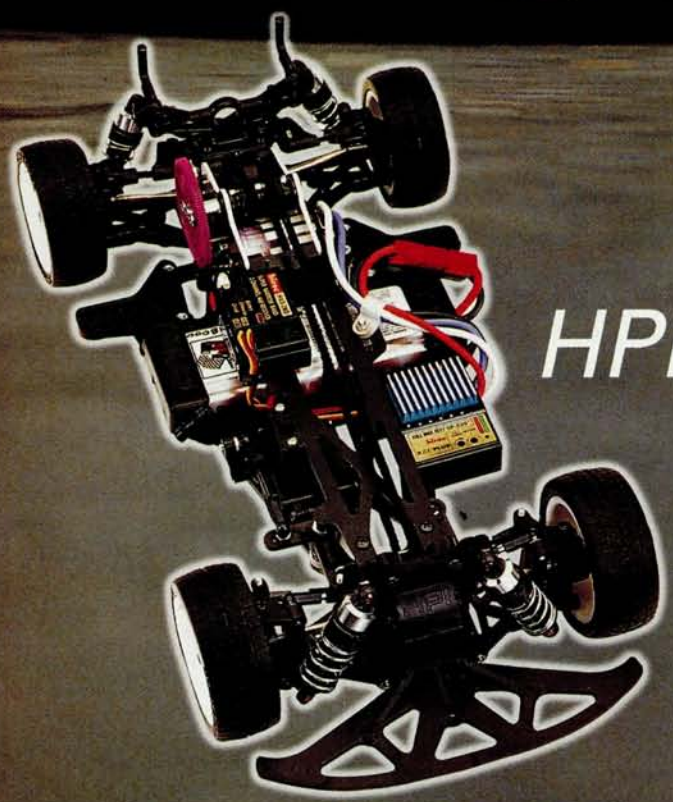
FINAL THOUGHTS

If you aren't concerned about all-terrain capability and are more interested in going fast, fast, *fast,* then you should definitely consider the Thunder Tiger On-Road Nitro Racer. It's quick off the bench, easy to operate, and as I've mentioned once or twice, it's mighty speedy. For real fun, try to con a few of your buddies into each getting themselves one; a handful of these high-velocity machines banging doors in a big, empty parking lot would be nitro-powered nirvana.

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

thrash TEST

1/10 scale electric



HPI RS4 Sport

HPI* HAS turned up the excitement quotient for its lineup this year with the release of the RS4 Sport 4WD touring car. Derived from the competition-ready RS4 Pro platform, the Sport includes the performance and tuning capabilities that racers demand, at a price that will attract newcomers to the hobby. With its simplified construction and available body shells that range from mild to wild, the RS4 Sport could be the car you need to launch your racing career.

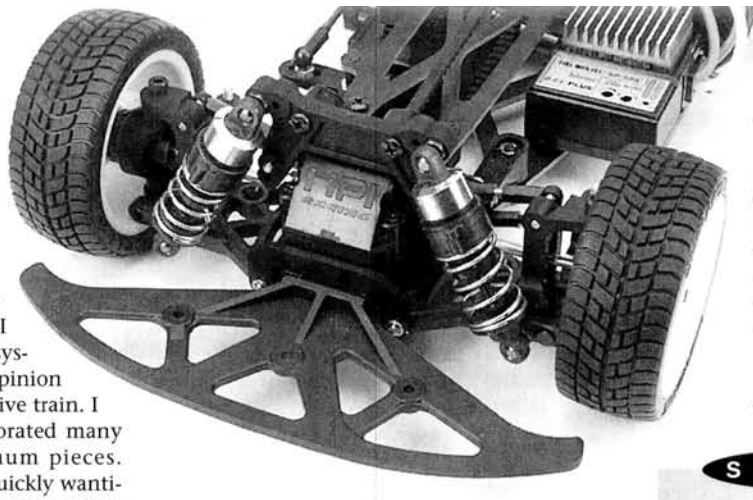
PHOTOS BY WALTER SIDAS

KIT FEATURES

• **Chassis.** The RS4 Sport is built around a double-deck, fiberglass chassis, with both the upper and lower chassis plates milled out to reduce weight without sacrificing rigidity. The steering is actuated by a traditional bellcrank/drag-link setup with an adjustable servo-saver; for extra-smooth performance, the steering bellcranks pivot on bushings. The chassis' battery holder is especially nice; it can be flipped open from either side and includes molded-in notches for the battery leads. Adjustable body posts, a sharp-looking front bumper and rear nerf wings are also standard.

More go for less dough

by Rick Eyrich

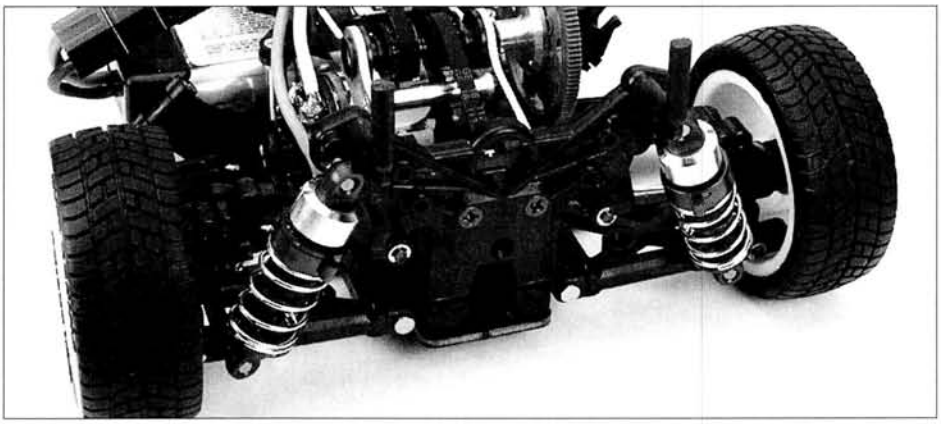


Along with upper camber links and lower A-arms lifted from the RS4-Pro, plastic versions of HPI's Pro Shocks comprise the sedan's front suspension layout. Although not shown here, a TD Enterprises Protector foam cushion was added to the front bumper for extra crash protection.

• **Drive train.** The Sport gets the power to the ground via dual belts that drive the front and rear bevel-gear differentials. The gear diffs spin plated dogbones, and the drive train turns on Oilite bushings. Belt tension is adjusted via a 9-position cam in the rear housing; I noticed very little drag in the system. The kit includes a 64-pitch pinion and spur gear to complete the drive train. I was impressed that HPI incorporated many of the RS4 Pro's trick aluminum pieces. Often, R/C'ers find themselves quickly wanting to upgrade their vehicles to achieve that cool "factory look." That's not the case with the RS4 Sport; this is one slick-looking touring car from the start!

• **Suspension.** The RS4 Sport includes HPI's new Pro front suspension, which is the same as the one on the RS4 Pro. Lower suspension arms with adjustable upper links allow quick trackside camber and caster adjustment. Threaded rods hold the steering links, front camber links and upper rear wishbones

I found that I could brake slide, cut and hook, or smooth my way around the corners. The RS4 Sport didn't care which technique I used.



The Sport's rear end also retains the composite plastic shocks. Rugged lower suspension arms and upper wishbones testify to its racing heritage. Plated dogbones connect the gear diff to the axles while HPI's own Super Radial tires claw the road for traction.

specs

SCALE	1/10
LIST PRICE	$219
DIMENSIONS	
Length overall	16.35 in.
Wheelbase	10.21 in.
Width (F/R)	7.45 in.
WEIGHT	
Gross, RTR	3 lb.
CHASSIS	
Type	Dual plate
Material	Fiberglass
DRIVE TRAIN	
Type	Belt-drive 4WD
Primary	Pinion/spur
Transmission	Dogbones
Differential(s)	Twin gear diffs
Bearings/bushings	Oilite metal bushings
SUSPENSION (F/R)	
Type	Upper/lower arms
Damping	Oil-filled shocks
WHEELS (F/R)	
Type	1-piece plastic
Dimensions (DxW)	2x1 in.
TIRES	
(F/R)	Standard-width treaded radials
ELECTRICS	
Motor, battery, ESC	Not included

YOU'LL NEED

- ■ 2-channel surface-frequency radio with steering servo and ESC.
- ■ Motor.
- ■ Lexan paint for body.
- ■ 7.2V battery pack.
- ■ Battery charger.

BUILDING & SETUP TIPS

The RS4 Sport's well-designed instruction manual will get you through the building process with few or no glitches. Its only shortcoming is the lack of gearing recommendations for various motor applications. As with most kits, however, there are always extra steps you can take to make building go a little easier.

• Use a slow CA when you glue the 2-piece belt pulleys together. I went a step further and used a spring clamp on each pulley to ensure that the halves stayed aligned while the glue cured.

• A TD Enterprises* Protector bumper was custom-fit to the chassis front bumper. The Protector was secured via the body posts with nylon washers and body clips.

• The twin rear nerf wings must be trimmed to fit the 190mm-wide body. After the wings have been cut back to the first molded ridge, smooth the edges with a Dremel* tool equipped with a sanding drum.

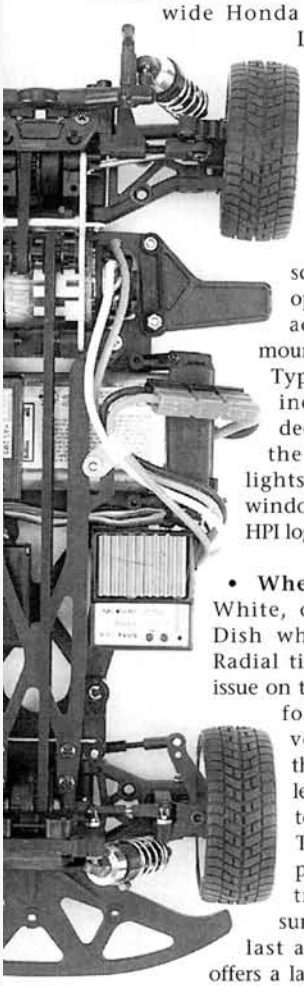
• The front drive belt sometimes rubbed lightly on the battery pack. To guide the belt, a homemade Lexan shield was servo-taped to the bottom chassis plate (just forward of the battery).

FACTORY OPTIONS

- ■ Pro Graphite chassis—part no. A232.
- ■ Ball-bearing set—B043.
- ■ Aluminum pivot shafts—A169.
- ■ 32-tooth ball-diff set—A508.
- ■ Slipper clutch set—A507.
- ■ Swaybar set—A209.
- ■ 2-speed transmission—A297.

together. On all corners, you'll find HPI's oil-filled plastic shocks; these feature aluminum caps and seals, air bladders and pivot-ball mounting for smooth performance and easy maintenance.

An ample spring-spacer selection is included with the kit, allowing you to alter spring pre-load on both ends of the car to achieve the proper ride height. The kit's shock oil was used for the test; as recommended in the instructions, internal shock-limiting spacers were installed inside the front shocks.



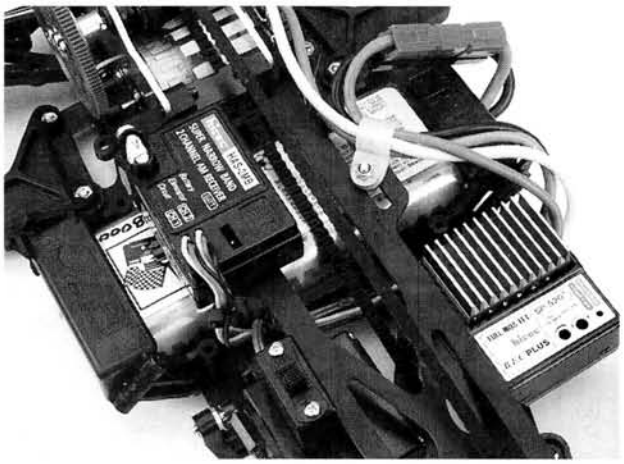
• **Body-shell mounting.** The 190mm-wide Honda Integra Type-R Lexan body comes with two rear wings: a wrap-around street spoiler and a large deck wing for racers. The body has molded dimples and scribed wheel-well openings to ensure accurate body mounting. The Integra Type-R body also includes colorful decals that include the front and rear lights, the front grill, window moldings and HPI logos.

• **Wheels and tires.** White, one-piece Super Dish wheels and Super Radial tires are standard issue on the RS4 Sport. The foam inserts and vented rims give the tires the excellent grip that 4WD touring cars need. The stock tires will provide adequate traction on most surfaces and should last a long time. HPI offers a large variety of racing tires in various compounds and tread patterns.

TEST GEAR

Because the RS4 Sport was designed for first-time racers, I opted to equip it with a sport-oriented radio system. The Hitec* Lynx pistol setup I chose comes with an HS-303 sport servo, a Hitec SP 520P reversing ESC and an AM receiver.

A Trinity* Midnight stock powerplant along with a Racer's Choice* Sanyo RC2000 6-cell battery pack was chosen to power the car. The radio gear was attached with MIP's* Super Servo Tape, and I added a RadioShack wire clamp to keep the ESC's motor and battery leads clear of the front drive belt. The final touch was to install Sermos* connectors on the ESC and battery.



The chassis uses a battery-fastening system that allows access from either side of the car—a very nice system indeed. The Hitec 520P ESC, HS-303 standard servo and HAS-2MB receiver all performed well in the RS4 Sport. A RadioShack wire guide clamp helps route the ESC's leads away from the drive belt.

PERFORMANCE

Because this was my first experience with an HPI sedan, I wasn't sure how well the car's Super Radials would grip the tarmac. My worries were for naught, as the tires kept the car locked to the pavement! Along with the car's smooth handling, this made for an extremely enjoyable first-time touring-car test session.

On the nit-picking front, I found the need to change only a couple of things on the Sport. The 35-tooth pinion that comes with the kit made the Midnight impressively fast in this application, but I switched to a Trinity Magic 31-tooth unit to increase run time. My only other mod was to install a homemade Lexan shield to prevent the front belt from rubbing on the battery.

On the second round of testing, the RS4 further impressed me with its maneuverability. I found that I could brake slide, cut and hook, or smooth my way around the corners. The RS4 Sport didn't care which technique I used. Top speed was also topnotch, even with a ROAR stock motor and the Oilite bushings. Of course, a ball-bearing set would help, but this sedan is plenty quick and stable straight from the box.

likes

- The fiber/composite parts are tough, and they fit great.
- Handled well straight out of the box.
- Body shell's molded body-mount markings are spot on.
- Tons of spares for wider version of car.
- No excess force required during assembly.

dislikes

- Front belt can rub on battery pack and motor can.
- Setup sheet lacks gearing advice.

FINAL THOUGHTS

I really dig this car! Some R/C'ers believe that 4WD touring cars are too complicated and costly, but the HPI RS4 Sport smashes that notion right down into the cracks on the tarmac. The car went together glitch-free, ran like a pro from the get-go and has managed to stay together, run after run. The RS4 Sport is one stout parking-lot weapon.

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

THE COMPETITION

	Tamiya KURE NISMO	Yokomo YR-4II	HPI RS4 SPORT	Kyosho TF-3
Wheelbase	10.1 in.	10.125 in.	10.21 in.	10.3 in.
Width	7.1 in.	7.125 in.	7.0 in.	7.75 in.
Weight	3 lb., 8.5 oz.	3 lb., 2 oz.	3 lb., 4 oz.	3 lb., 5 oz.
Diff type	Gear	Ball	Gear	Gear
Chassis	Plastic tub	Fiberglass	Fiberglass	Fiberglass
List price	$312	$250 (est.)	$219	$259.50
Available at*	$169.99	$140 (est.)	$159.99	$219.95
Reviewed in	6/97	10/97	–	1/98

**Prices vary with location.*

thrash TEST
1/10 scale electric

Trinity Switchblade 10 On-Road Racer

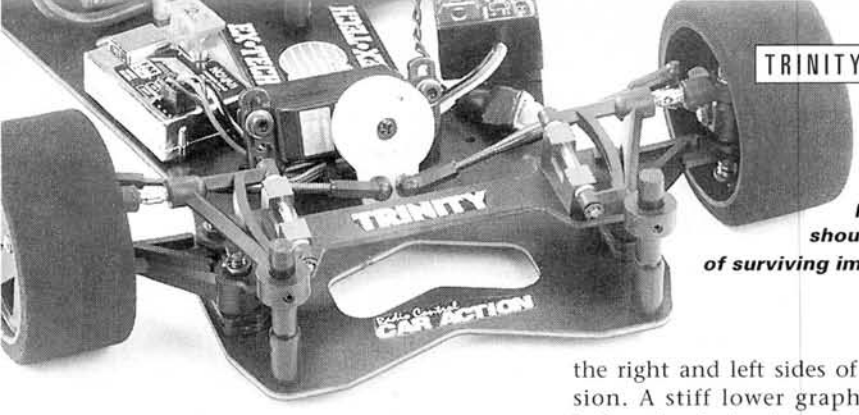
by Doug Mertes

It all began at the inaugural IFMAR On-Road World Championships back in 1992. With its combination of great features—like a trailing-link rear pod and triple-shock suspension—and its **radical design elements,** which included in-line battery placement and a precisely adjustable front end, Trinity's* triumphant Evolution 10 made everyone in the on-road R/C world **sit up and take notice.** Time marches on, and Trinity has kept pace. Check out the Evo's successor—an on-road assault vehicle called the Switchblade. With a

PHOTOS BY WALTER SIDAS

all new on-road assault vehicle

slew of **all-new features** that update Trinity's pan-tech, the Switchblade looks ready to tackle the oldest **mission in racing: victory!**



TRINITY SWITCHBLADE

This new front end is every bit as adjustable as its predecessor, and it should do a better job of surviving impacts.

THE KIT

The Switchblade has Trinity's tried-and-true trailing-link rear pod and complementary triple shock suspension. A particularly strong performer in the past, this type of suspension can yield incredible levels of mechanical traction while allowing individual tuners to dial out as much rear grip as they want to. This is especially critical on low-traction paved surfaces like concrete and asphalt, and it's one area in which T-bar cars are really at a disadvantage. That's why Trinity cars continue to be the choice of so many pavement warriors: they have bunches of rear traction that you can dial out very precisely in small steps.

Trinity's design team also abandoned their previous battery-location preference and instead chose a more conventional saddle-pack configuration. The absence of a T-plate allows the cells to sit closer to the chassis' centerline, and a new battery-retainer plate eliminates the need to tape the batteries in place.

Up front, the old turnbuckle-style upper suspension arms have been replaced by molded-plastic units that ensure symmetry of the right and left sides of the front suspension. A stiff lower graphite plate forms a bridge that locks the two lower arm mounts together, while one-piece upper arms make it easy to set camber and caster. Like its predecessor, the new suspension is fully adjustable, but I guarantee that it will be more durable in a crash than the previous design. The Switchblade's front end can also be tuned for the rate of reactive caster simply by adding thin spacers—a particularly useful adjustment when faced with tricky track designs and unusual surface conditions. For this review, Trinity also sent along a set of machined, purple-anodized aluminum lower arms. These should definitely enhance handling because they help lock in the kingpin's bottom end when the car runs on a tight, twisting track.

The completed Switchblade weighed in at precisely 42 ounces complete with receiver pack, so I didn't have to add lead weights to make the Switchblade legal for racing in the highly competitive 1/10-scale pan-car class. On pro-level cars, it's not unusual to see quarters taped in strategic locations, but the Switchblade was designed and manufactured to put you right where you should be on the scales without your having to worry about it.

specs

SCALE	1/10
LIST PRICE	$299.99
DIMENSIONS	
Length overall	13.5 in.
Wheelbase	10.12 in.
Width (F/R)	8.22/8.42 in.
WEIGHT	
Gross, RTR	2 lb., 10 oz.
CHASSIS	
Type	Single plane
Material	Fiber-reinforced graphite
DRIVE TRAIN	
Type	Direct drive
Primary	Pinion/spur
Differential(s)	Ball diff
Bearings/bushings	Bearings
SUSPENSION (F/R)	
Type	Reactivecaster (optional constant caster)
Damping	Optional silicone paste on kingpin
WHEELS (F/R)	
Type	Standard pan pattern
Diameter	1.8 in.
TIRES	
Front/rear	Jaco medium-compound green foam
ELECTRICS	
Motor, battery, ESC	Not included

BUILDING & SETUP TIPS

Although most pan-car designs are very simple, they require great precision during assembly if you're going to run at the front of the pack. Take your time, measure dimensions and parts whenever you're unsure of their placement or adjustment, and do things right the first time. Trinity's assembly manual is very clear and easy to understand, and it contains lots of pictures to get you through the steps you may not easily understand. The front end uses a separate booklet that applies to both 1/10 and 1/12 scale, and helpful setup tips can be found on the last few pages of both booklets.

■ Using a rotary tool with a pointed grinding stone, I beveled the edges of the battery slots on both the chassis and the battery retainer; this prevents short circuits caused by sharp graphite edges cutting through battery insulation. All of the graphite parts' edges were sanded with wet/dry sandpaper. After washing all of the sanded pieces, I applied medium-thickness CA to the outside edges and cutouts to prevent them from splitting under stress or impact. This is something that pro-level racers have been doing for years; there's no weight penalty, and it may keep you from a DNF during a hotly contested heat or Main. Besides, graphite parts are expensive!

■ The kit comes with top-of-the-line TRC wheels and tires in TRC's green compound. This is a pretty good all-around density to start out with, especially if you run on carpet. On an asphalt or concrete surface, my experience with the car would suggest using a natural or exotic compound: pinks, whites, or purples on the rear and pinks or purples up front. They'll last longer and make the car more "tossable" in the turns. I used the included stock front springs throughout my testing, but there are lots of optional accessory springs available from Trinity as well as aftermarket manufacturers like Wolfe Motorsports* and BRP*. Up front, I smeared a little of Trinity's Purple Stuff on the front kingpins when I needed to slow down reaction times or eliminate chatter. I built the front end with reactive caster blocks for maximum steering, but placed a thin spacer under each upper front arm mount to slow down camber change in fast sweepers. It's easy to change initial caster settings by moving the white Teflon washers that space the upper arms. If you want to eliminate the reactive caster, simply remove the angled upper arm supports and replace them with the included flat supports that maintain constant caster settings through the full range of front wheel travel. The pre-drilled servo mount holes fit the Airtronics servo perfectly.

■ I found the Switchblade very easy to dial in, and I was able to get my lap times down a little bit with every small adjustment I made. I'm sure you can eventually get to a point at which the car is just too loose to drive, but I never found that zone. Experienced fast guys like their cars very loose and sweepy, while novices prefer a little push to keep them out of trouble. I'm sure you can get the Switchblade to assume any attitude you prefer.

FACTORY OPTIONS

- **Purple-anodized aluminum lower suspension arms—part no. SB5077**
- **Damper lube in various weights—RC6051 (heavy), 6070 (medium), 6071 (light)**
- **Progressive-rate front springs in various ratings—EV0099-EV104**
- **Constant rate front springs in various ratings—EV0125-EV0132**
- **On-center steering blocks—SB5031, with corresponding stub axles—5032**

YOU'LL NEED

- **Body**
- **Electronic speed control**
- **Radio gear**
- **Steering servo**
- **6-cell battery in saddle-pack configuration**
- **Stock or modified motor**
- **Battery charger**
- **Pinion gear**

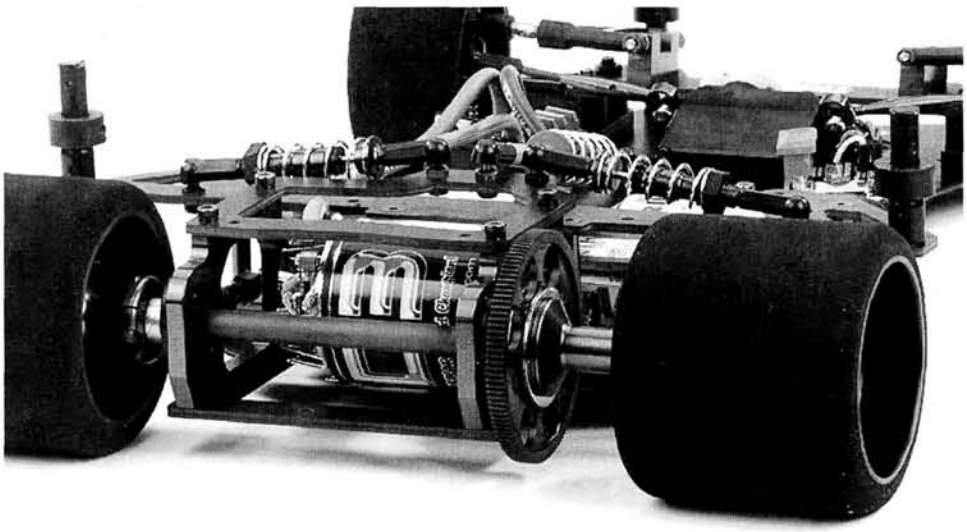
TEST GEAR

I chose to use a "Factory Trinity" setup for the Switchblade; it included the new D3 motor, a six-pack of Trinity's renowned matched Sanyo 2000 cells and an M.troniks* Pro-digi micro speed control. In addition to its nifty gold-plated looks, the D3 sports new, larger solder tabs for easier, stronger wire attachment.

Novak's* Mercury receiver is a natural for a car of the Switchblade's caliber, and an Airtronics* 94145 was a drop-in fit for the SB10's pre-drilled servo-mounting holes.

To complete the car's drive train, I installed one of Trinity's lightweight, Zero Friction spur gears; its lightness should result in faster acceleration out of turns.

Finally, a Protoform* Nissan P-35 body in Trinity trim was clipped into place to make the Switchblade competition-ready. The completed car looked too lethal to spring on an unsuspecting group of competitors!

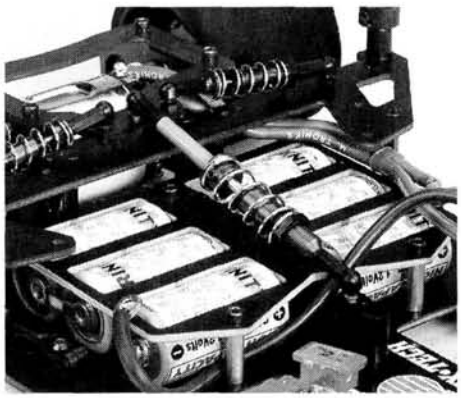


Those who have worked with Evolution 10 cars will recognize the twin trailing arms and triple shocks. A truly potent combination: Trinity's new D3 mod motor and lightweight Zero Friction spur gear. Yeow!

PERFORMANCE

When I show up at the track, people suspect that I'm testing a new car, a new setup or a high-zoot product. I can usually tell how well a piece of equipment is doing by the length of time it takes fellow racers to saunter over to my pit area after I've made my first practice run. They casually inquire what's new this week. Using that indication, I'd say that the Switchblade is an unqualified success: less than 30 seconds into my initial practice run, three racers were standing behind me at the drivers' stand, and all wanted to know which killer car I had managed to get my hands on. All three drove it, and all three immediately put their current cars up for sale so that they'd be able to buy Switchblades; it's just that smooth and adjustable.

I spent some time messing around with tire compounds and eventually settled on pink fronts and purple rears (I told you this car had lots of rear traction!). As the day got warmer and the track surface was swept off by the other cars, it was soon time to make some changes. On the side shocks, I increased both shock-fluid viscosity and spring tension, but I stuck with the 25WT I had put into the center shock while I was building the car. I like a lot of caster in the front end (less on-power steering at the end of the straights, but plenty of off-power steering in tight corners); the new front-suspension design allowed me all the adjustment I needed, and reactive caster made the car great at pounding out of the infield corners. The Pro-digi ESC and Novak* receiver worked flawlessly, as you would expect, and the D3 motor seemed perfect for this application: lots of grunt out of the corner combined with blazing top-end speed. This was my first experience with Trinity's new modified mauler, and I must say that I'm very impressed!



Look, Ma!—no battery tape! The battery-retaining plate does a great job of holding the cells in place.

likes

- So easy to dial in that it makes everyone look like a pro.
- Well-designed and able to take a pounding.
- Front end is very durable, yet gives the tuner many setup options.
- Triple-shock rear-pod design yields maximum traction.

dislikes

- None worth mentioning.

FINAL THOUGHTS

Last year was great for new releases in the 1/10-scale pan-car category; virtually all of the major manufacturers released new designs. Though I haven't driven or tested all of them yet, this latest offering from Trinity is sure to be a strong contender for class leader. If you've never seen cars like these running nose to tail in a high-speed train around a carpet or asphalt track, you should check it out. I guarantee that once you've seen it, you won't be able to sleep until you've tried it yourself. But if you're already an experienced on-road warrior, I suggest that you make the new Trinity Switchblade your new weapon ... before the competition does!

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

THE COMPETITION

	Bolink LTO EXTREME	Trinity SWITCHBLADE	Associated RC10L20	HPI ROADSTAR 10GO
Width (F/R)	7.8 in.	8.22 in./8.42 in.	7.25 in./ 7.75 in.	7.5/ 7.74 in.
Weight	2 lb., 10 oz.	2 lb., 10 oz.	2 lb., 10 oz.	2 lb., 10 oz.
Diff type	Ball	Ball	Ball	Ball
Chassis	Graphite	Single plane fiberglass	Graphite	Graphite
List price	$239.95	$299.99	$260	$335
Available at*	$179.99	$169.99	–	$199.99
Reviewed in	–	2/98	5/97	–

**Prices vary with location.*

COMPETITION

GOLDEN AGE OF

DID YOU EVER notice that although our hobby is known as "radio-controlled cars," the radios don't get half the attention that the cars do? I've seen guys at the track with machines that are absolutely cutting edge—from the tips of their titanium hinge pins to the ends of their blue-anodized motor plates—yet they still use battered old sport radios to move these uber-cars around the track.

Smart racers, on the other hand, transfer some of their purple-screw fund into their radio budget. With today's new super-radios, much of the critical tuning it takes to be competitive can be done right from the drivers' stand with a few button clicks.

If you're trying to figure out which of these high-tech transmitters you should add to your racing arsenal, this is the guide that will help you decide. We've grabbed the latest flagship transmitters from Futaba*, Airtronics*, JR* and KO Propo* and assembled all their facts and features in an easy-to-use guide. There's even a glossary of radio terms, so you'll know exactly what the features can do for you, and there are a few tips from the pros for extra flavor.

FUTABA MAGNUM 3PJ

Futaba's elegantly designed 3PJ is a pleasure to hold and operate, and its palm-filling rubber grip and silky-smooth trigger throw add to its precise feel. A large LCD screen allows easy viewing of its many adjustment options, which include such niceties as ABS braking, 8-model memory, traction control, 3-channel capability, fail-safe operation and adjustable steering-servo speed.

Futaba has also incorporated some exciting "smart" features such as traction control, which is a sort of autopilot. This function helps the car cope with starts on slippery tracks by allowing the radio to control the throttle digitally for a smooth acceleration your finger just can't match. Once the car reaches your preset speed setting, throttle control is yours. Gas racers will appreciate the idle-up feature, which provides a higher idle setting for starting and warmup and then returns to the specified throttle settings at your command. Coupled with its comfortable case and the Futaba reputation for reliability, the Magnum 3PJ is a good choice for any serious competitor.

The 3PJ's large screen is packed with info; note the "sliders" used to graphically indicate the steering and throttle trims.

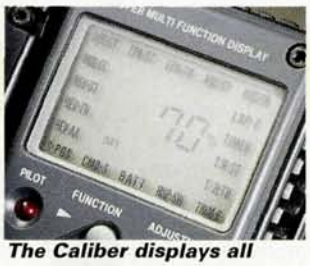
GLOSSARY OF TERMS

- **Adjustable travel volume (ATV):** this is preceded by "throttle" or "servo" to indicate which channel is being adjusted. This setting determines the total range of servo travel from full left to full right. Left and right throw can be adjusted independently with this function; this can be especially useful when setting up throttle linkages for gas vehicles. Also known as Servo EPA (End Point Adjustment).
- **Exponential (EXP):** this adjustment allows the user to adjust the throttle or steering servo's reponsiveness around the neutral setting. For example, if steering exponential is set for a negative value, the servo will respond less quickly to the movement of the steering wheel near neutral and more quickly as the wheel reaches the limit of its travel. Conversely, a positive value causes the servo to be more responsive around neutral and less reponsive at the limits of travel. The greater the value input to the radio, the greater the difference in servo speed from most to least responsiveness.
- **Model select:** a very helpful feature that allows the radio to store your custom settings for several models. This eliminates the need to tediously reprogram when you swap the radio between vehicles. With a touch of a button, you can switch from 1/8-scale buggy settings to 1/12-scale carpet car mode; some radios can store settings for as many as 10 models.
- **Custom key:** allows the user to assign a frequently used function to a single button for easy access.
- **Subtrim:** a fine adjustment for precisely centering the throttle and steering servos.
- **Steering/throttle speed:** allows the user to alter the speed of the servo in relation to the trigger or wheel input without adding any "curve" or exponential value.
- **ABS:** similar to the automatic braking system in a full-size car, R/C ABS causes the throttle/brake servo to pulse at a user-set rate to simulate the way in which a driver would pump the brakes to avoid lockup in a full-size car. May also be used with ESC-equipped vehicles.
- **Idle setting:** a useful option for gas racers. Idle setting allows the throttle servo to hold the carb open to a user-set position for easier starting and warmup, then return to the original idle setting without affecting the other throttle-trim adjustments.
- **Burst throttle:** designed to overcome clutch lag in gas cars, this makes the throttle react quickly when transitioning to forward throttle from neutral; it can also be set for faster brake actuation.
- **Traction control:** helps tp prevent wheelspin by feathering the throttle servo or altering its speed within user-set parameters
- **Timer/stopwatch:** few of us have the luxury of a private transponder system for practice laps. An on-board stopwatch allows the user to time and recall laps by pressing a thumb switch while driving. Some units can also be set to beep at preset intervals to let you know how much time is left in the race.
- **Dual rate:** allows the amount of servo throw to be adjusted on the fly.
- **Partial throttle start:** can help prevent wheelspin at the start of a race. The radio will advance the throttle to a user-set cutoff point instead of reaching full throttle, even if the trigger is squeezed to full. The throttle returns to normal operation once the user brakes or reduces speed.
- **Fail-safe:** if radio contact is lost, this feature will return the throttle and steering servos to your preset fail-safe positions (usually full brake and no steering). This feature works only when the radio is in PCM mode.

RADIO GUIDE

RADIO by Peter Vieira

AIRTRONICS CALIBER 3PS



The Caliber displays all available options at once, highlighting the feature in use with a flashing bar.

Visit almost any racetrack, and you'll find that few transmitters are as ubiquitous as Airtronics' 3PS. There's good reason for its popularity. While notable for its wide range of features, the 3PS is perhaps more appreciated for how easy it is to *use* all those features. Each function is shown on the LCD screen at all times, and that makes it easy to see where you are as you cycle through the functions.

Once you arrive at the function you need, plus and minus keys raise or lower its value—simple. Four large knobs are available for good, old-fashioned analog adjustment; throttle EPA, throttle trim, steering trim and auxiliary channel control stand ready for a quick twisting. As if to match the flexibility of the Caliber's software, its case is also adaptable; a few minutes with a screwdriver is all it takes to reconfigure the Caliber for left-hand operation.

AIRTRONICS M8

The Caliber is tough to top, but Airtronics appears to have risen to the challenge with its flagship radio, the M8. Viewed from the side, this sleek transmitter appears to be missing the trademark feature of computer radios: an LCD screen. But it's there all right; it just happens to be mounted on the top of the radio—all the better for while-you-drive viewing.

All your favorite features from the Caliber return with the M8, but there are new features as well; model-memory capacity has been upped from 3 to 10 vehicles, throttle and steering-servo speeds are now adjustable, as is the LCD screen's contrast. In addition to its performance, packaging is part of the M8's allure; the ergonomic case design has a balanced, precise feel, and the controls are well positioned.

Dig the "fuel gauge" battery meter. The display also shows how long the unit has been switched on.

- **Model copy:** allows the user to duplicate model settings; for example, you might want to copy the setup for your buggy as the starting point for your truck.
- **Pulse-code modulation (PCM) and pulse-position modulation (PPM):** standard FM uses the PPM system; PCM operation allows the use of a fail-safe option.
- **Command signal adjustment:** On the drivers' stand, it can be difficult to tell your own radio's beeps from those of someone else. Adjusting the pitch of your beeper gives your radio a signature sound. Some transmitters allow you to assign different tones to different functions.
- **System level:** although the myriad features competition radios offer are useful, they may be intimidating to beginners or simply not needed in some applications. Multi-level capability allows basic radio adjustments to be activated without the need to cycle through every feature. As skill or need merits, the user may activate more functions with each successive level.
- **Trim rate:** adjusts the amount of trim range available.
- **Third channel:** the 3-channel capability of a transmitter is rarely exploited in cars, but it can be useful for functions such as onboard needle-valve adjustment, articulated wings and driver figures, or a parachute release mechanism in drag vehicles. The third channel can be operated like an on/off switch to swing the servo arm from full left to full right at the touch of a button; or it may be operated as a dial, so that turning a knob a few degrees will also move the servo arm a few degrees.
- **Battery alarm:** an alarm that sounds when the radio's battery voltage falls below its requirements for reliable operation.
- **Response key:** rather than click over to the steering and throttle exponential screens to manually adjust each value, the response key allows a single button to access preset optional values.
- **LCD contrast:** adjusts the intensity of the LCD (liquid-crystal display) screen. Adjustable contrast ensures that you'll have a clear view, regardless of lighting or temperature extremes.
- **Key lock:** locks the radio's input buttons and trim levers so that accidental handling won't affect your settings.
- **Direct servo control (DSC):** a physical link to the receiver allowing the radio to operate the vehicle without transmitting a signal.
- **Display only:** by activating only the display and not the radio's transmission system, the user may adjust the radio without interfering with other drivers.
- **Wheel tension:** a mechanical adjustment of the force required to operate the steering wheel.
- **Mixing:** rarely used with R/C cars, mixing allows the user to tie two functions together; for instance, you might "mix in" a little left steering input with the throttle to compensate for a car's tendency to pull to the right under acceleration.
- **Throttle/steering punch:** this adjustment causes the initial movement of the wheel or trigger to cause a faster than normal response at the servo. After the initial burst of movement, servo speed returns to normal.
- **Multi-speed throttle/steering:** causes the servo to alter its speed in steps; for instance, the throttle channel might be set to move the throttle servo more slowly in the first third of travel, then normally for the second stage, and quickly for the remainder of the travel range.

RADIO BASICS

Once you've learned to ride a two-wheeler, the training wheels come off. When you've learned to swim, it's bye-bye water wings. And apparently, when you learn to hang with the likes of Kinwald, Hohwart, and Johnson, you don't need a lot of fancy radio features to help you out! That point was driven home by all the top-echelon drivers I spoke with. Sure, they like the precision and signal strength of the high-zoot radios, and ergonomic niceties such as adjustable wheel and trigger tension are cited as pluses; but depending on the driver, many of the performance-enhancing features were left unused.

Somebody is using all those features—but who? You and I, that's who. The average guy who's looking for an advantage. To show what a computer radio can really do, I'll explain how my KO* Mars helps me set my car up more easily and get it around the track a little faster. The tips detailed here may be used with any of the radios in our guide.

1. Baseline settings

I always begin my radio setup with "straight" baseline settings:

- no steering or throttle exponential;
- travel for both channels set to 100 percent;
- no dual-rate.

Although I have a non-setup at this point, I'll give the settings a name in the radio's memory. I'm setting up for my TA03 in this case, so I'll punch "TA03" into the memory. If you're feeling creative, a full assortment of upper- and lower-case letters, punctuation marks, symbols and (in some cases) Japanese characters can be used to name your cars.

2. Steering travel

- With my baseline setting in place, I'm ready to switch the car on and dial in the steering. First, I check the wheels to make sure they're centered. My TA03's front end is just a bit skewed, so I'll dial in the sub-trim to center it.
- Next, I check the travel range. In this case, the steering servo has more throw than the linkage can accommodate, so I'll back down the steering travel (ST:TRAV) from 100 to 86. The setting is arbitrary; I just kept lowering the figure until there was no servo bind.
- Some cars have linkages that deliver slightly more throw in one direction than another; this can be compensated for by adjusting right and left servo travel independently. On the Mars, this is the Steering Balance adjustment (ST:BLANC)—aka steering endpoints. My TA03 needs just slightly less right throw, so I'll dial it down until it equals left throw. With that done, I have 72 percent right throw and 100 percent left.

3. Throttle travel

My Tekin G12cIII speedo will set itself to whichever signal the Mars is pumping out, but I like to follow Rick Hohwart's advice and

JR R1

JR took the old cliché of a picture being worth a thousand words to heart when they created the new R-1. In addition to the usual numeric values used to quantify the radio's various adjustments, the R-1 graphically displays the effect of the user's button clicks; for instance, dial in some throttle exponential, and a graph of the throttle curve changes before your eyes. Click in a few degrees of trim, and a bar graph shows the servo's neutral point moving within the total travel range. The action takes place on a Gameboy-size screen that is cleverly hung beneath the steering wheel for easy viewing.

Expo curves and "sliders" make it easy to see what the R1 is up to. The curves will actually "bend" with each key click.

If you just can't take your eyes off the track audible cues also help with adjustments: each key beeps with its own tone so your ear can tell you which key you're pressing. Some functions change in pitch as they are adjusted to indicate position (much like the sound of someone dragging his hand across piano keys); the higher the pitch, the closer you are to the end of the adjustment range. With a full range of features including 10-model memory, ABS braking and multi-point throttle and brake curves, the LCD screen and multi-tone keys should be kept very busy.

PISTOLS OF THE PROS

Why they choose 'em, how they use 'em

Rick Hohwart on the Futaba 3PJ

To everyone on the national race circuit, Rick is a familiar face—not only as a competitor, but also as the president of Peak Racing Motors. He took a break from testing his latest powerplant to talk to us about the Futaba 3PJ.

R/C Car Action: Weren't you one of the first to get a 3PJ in the U.S.?

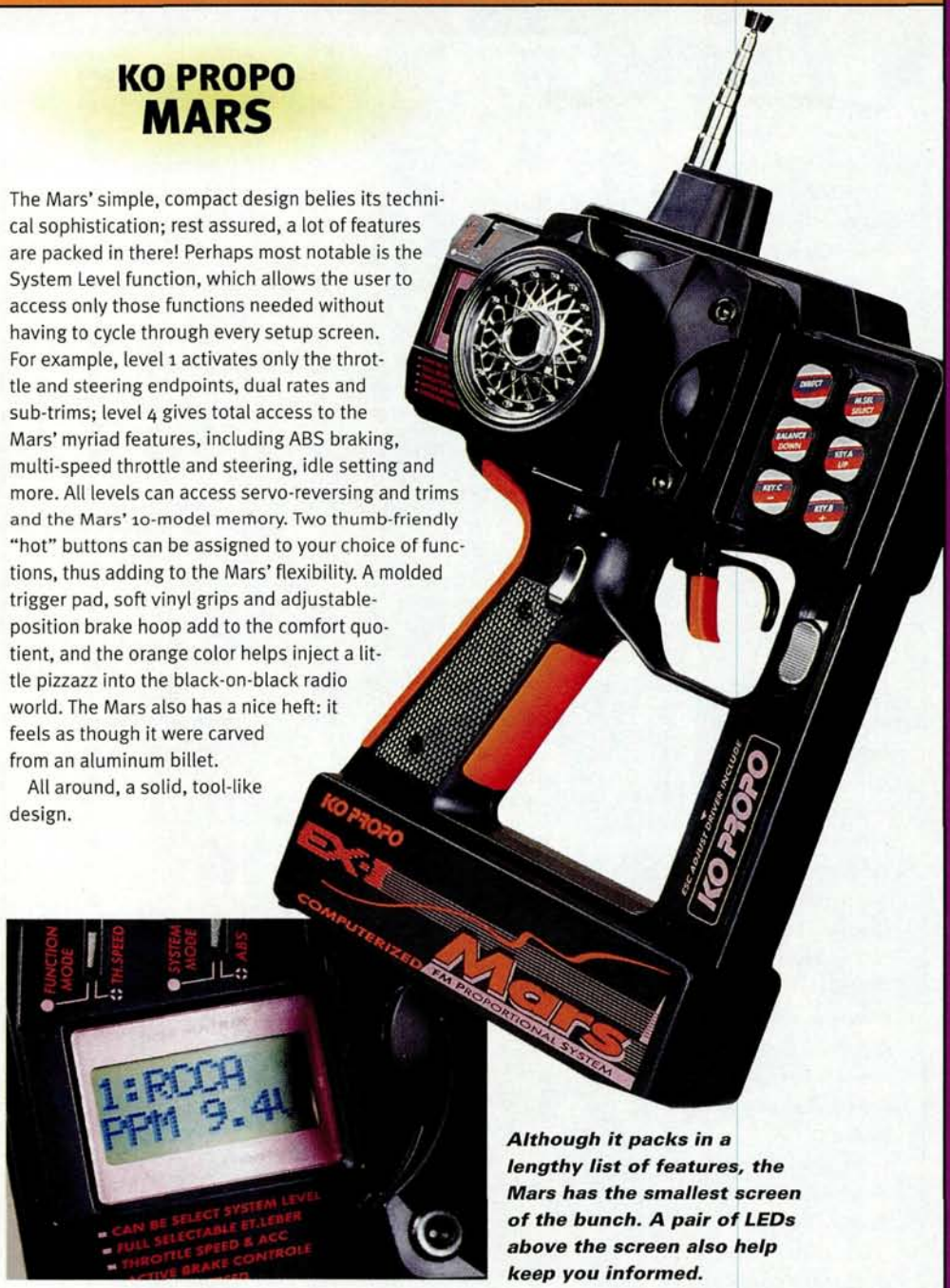
RH: I was *the* first. I've had mine since the last Off-Road World Champs.

RCCA: What do you reach for first when you're dialing in your radio?

KO PROPO MARS

The Mars' simple, compact design belies its technical sophistication; rest assured, a lot of features are packed in there! Perhaps most notable is the System Level function, which allows the user to access only those functions needed without having to cycle through every setup screen. For example, level 1 activates only the throttle and steering endpoints, dual rates and sub-trims; level 4 gives total access to the Mars' myriad features, including ABS braking, multi-speed throttle and steering, idle setting and more. All levels can access servo-reversing and trims and the Mars' 10-model memory. Two thumb-friendly "hot" buttons can be assigned to your choice of functions, thus adding to the Mars' flexibility. A molded trigger pad, soft vinyl grips and adjustable-position brake hoop add to the comfort quotient, and the orange color helps inject a little pizzazz into the black-on-black radio world. The Mars also has a nice heft: it feels as though it were carved from an aluminum billet.

All around, a solid, tool-like design.



Although it packs in a lengthy list of features, the Mars has the smallest screen of the bunch. A pair of LEDs above the screen also help keep you informed.

RH: The number-one thing is to get the ATV and endpoints right. You don't want the steering servo to try to push past the limits of the steering linkage, or you'll get a lag when the servo returns to neutral. Jamming the servo like that can also cause the servo to pull a lot of amps and drain the battery. And it's just plain bad for the servo.

I like having model memory ... Now I can just select the car, and it's done

RCCA: Which adjustments do you use to dial in your car's handling?

RH: I really don't use anything! I don't use any exponential or dual rates, and I always have my steering set for max throw. I want to be able to turn as tightly as possible to get through the infield and around crashes. If I need less steering, I turn the wheel less! I think you'll find that true of most of the fast guys. When we were starting out, radios didn't have all the features they do now, so we never missed them.

(Continued on next page)

set the throttle for more forward throw than brake. The Mars' presets are fine:
- full throttle (TH:HiPOT) is set at 150;
- brake (TH:BRAKE) is set at 100.

All I need to do is run through the automatic setup procedure with the ESC, and I've finished until I hit the track.

4. On-the-fly steering adjustment

After tossing a few corner markers onto the *Car Action* test lot and cutting a few laps, I decided that my TA03 was a little too aggressive in the steering department. However, there are parts of the course where a single corner dot represents a hairpin turn; a dual-rate setting for the sweepers would leave me out of the running in such tight quarters. To "numb" the steering slightly, I'll dial in some steering exponential (ST:CURVE). Unlike Brian Kinwald, I like a big chunk of expo. In this case, 17 percent feels about right. Another option would be to adjust the servo's speed; this isn't necessary in my case, as I have a mild servo installed in the car. If I had a servo with a very fast transit time, the ST:SPEED value could be lowered to slow the servo response.

5. Throttle tricks

On a slippery track where it's tough to launch without lighting the tires, throttle exponential (TH:CURVE) can be added to help put the power down smoothly. My TA03 has gobs of traction, so this isn't necessary. I will, however, try the Active Brake Setting (ABS) feature, as my one-way-equipped TA03 only brakes with the rear wheels and they lock up readily. The Mars allows the ABS pumping cycle to be adjusted (ABS:CYCL), as well as the delay time before ABS activates (ABS:DLY) and the amount of "pump" for each cycle (ABS:DUTY). The factory settings for DLY and DUTY seemed fine, but I did change the cycle value to 60. To better visualize the difference between settings, I plugged a spare servo in to the receiver's throttle channel so I'd be able to watch the servo horn for changes in the amount and speed of the ABS pumping. The ABS system works; although I can still break traction and spin the car if I jam the brakes to full, less aggressive stops are more smooth and controlled than I could ever manage with my finger. Similar effects can be obtained by using an exponential setting on the brake side of the trigger throw, but I found that the car brakes more effectively with ABS.

The tuning options I selected here represent only a fraction of the capabilities of the Mars and the other radios in this guide. Although any of the computer radios can go from carton to car in minutes and be adjusted easily for basic functions, it takes time to fully exploit all the available features and benefits. Spend a little quality time with your radio, manual and favorite car, and you'll see dividends on race day!

Rick Hohwart on the Futaba 3PJ

(Continued from previous page)

RCCA: Do you have any radio setup tips?
RH: I always use alkaline batteries, as they have more voltage than Ni-Cds. I might use rechargeables for a club race, but not for an event. For throttle, I set the electronic trigger throw for 70 percent throttle and 30 percent brake; it feels more linear. For steering, I like to put the wheel tension on the softest setting.

RCCA: What do you like best about the 3PJ?
RH: I like having model memory. I can remember having to re-trim my radio for different cars between heats—a real hassle. Now I can just select the car, and it's done. The 3PJ also has really good balance and weight and is comfortable to hold.

RCCA: Thanks for the tips Rick, they're appreciated!

FEATURES AT A GLANCE	AIRTRONICS Caliber 3PS	AIRTRONICS M8	MARS KO	JR R1	FUTABA Magnum 3PJ
Steering ATV/EPA	■	■	■	■	■
Throttle ATV/EPA	■	■	■	■	■
Steering exponential	■	■	■	■	■
Throttle exponential	■	■	■	■	■
Model memory	3	10	10	10	8
Model copy	–	■	■	■	■
Custom key	–	–	■	■	■
Steering subtrim	■	■	■	■	■
Throttle subtrim	■	■	■	■	■
Steering speed	–	■	■	■	■
Throttle speed	–	■	■	■	–
ABS	–	–	■	■	■
Idle setting	■	■	■	■	■
Burst throttle	–	–	–	■	■
Traction control	–	–	■	■	■
Elapsed timer	■	■	■	■	■
Up timer	■	■	■	■	■
Down timer	■	■	■	■	■
Lap timer	■	■	■	■	■
Dual rate	■	■	■	■	■
Partial throttle start	–	–	■	■	■
PCM/PPM operation	PPM	PPM	PPM	PPM/PCM	PPM/PCM
Fail-safe (PCM only)	–	–	–	■	■
Command signal adjustment	■*	■	■	–	■
System levels	–	–	4	2	–
Trim rate adjustment	■	■	■	■	■
Three channel	■	■	■	■	■
Battery alarm	■	■	■	■	■
Response key	■	■	–	■***	–
LCD contrast	–	■	■	■	■
Key lock	■	■	–	–	–
Direct servo control	■	■	–	■	■
Display w/o signal	■	■	–	■	■
Wheel tension adjustment	■**	■	–	■	■
Left-hand adaptable	■	■	–	–	■
Mixing	–	–	–	■	■
Trim memory	■	■	■	■	■
Throttle punch	–	–	■	–	■
Steering punch	–	–	■	–	–
Multi-speed throttle	–	–	■	–	–
Multi-speed steering	–	–	■	–	–

* on/off only, **disassembly required, ***user assignable

Brian Kinwald on the Airtronics M8

We caught up with Brian at M n M Speedway for his thoughts on the M8. As the world champ, Brian spends a lot of time with a transmitter in his hand; but you'll probably surprised to discover how he uses his radio. Check it out ... .

R/C Car Action: The new M8 is pretty scarce. Have you got one yet?
BK: Yes ... well, I *had* an M8. I took it apart as soon as I got it, and it just wasn't the same after I put it back together! Airtronics is repairing it for me.

RCCA: Why did you take it apart? I'd be a nervous wreck if I cracked open such a big-dollar radio.
BK: I wanted to tighten the springs on the trigger and wheel so that they would center better. I run very little deadband on my [Novak] Cyclone, so the throttle trigger's neutral point has to be very precise; cutting the springs helps.

The car seems to react more quickly to input; you can feel it in your hands.

RCCA: Before our readers start hacking their radios, tell us whether that's a tip the average driver can benefit from?
BK: Probably not. If anything, it will make a car harder to drive. You have to have very steady hands when there's so little deadband. It's a setup I like, but it's not for everybody. You'll also void the radio's warranty.

RCCA: Do you use any other custom tricks to modify your radio gear?
BK: On really large tracks, I shield my receiver with brass sheet grounded to the negative pin on the receiver's third-channel receptacle. It increases my range.

RCCA: How did you get that idea, and does it really work?

Jack Johnson on the JR R-1

Although retired from big-time racing, Jack Johnson remains one of R/C racing's all-time greats. In addition to being one of Losi's luminaries on the track, Jack has spent much of his career holding a JR radio. We couldn't think of a better racer to discuss the new R-1.

Car Action: How much of a hand did you have in developing the R-1?
JJ: I wouldn't say that I was directly involved in the development of the R1, but I have been using the R-756 since before it was released and have been keeping in touch with JR and giving improvement suggestions. In fact, I had one of the very first prototype 756 radios; I was surprised when I opened the case on that early radio to change a fuse. That's what happens when you try to quick-charge your radio's battery pack. The circuit board looked like one of those "bread-board" kits that you get from RadioShack, with all sorts of components sticking out of it. After about a year, the paint started to wear off of the case, and I had to throw in the towel and get a production radio!

If the car has a little too much steering, I can simply spin the thumb wheel and adjust the steering to the current track conditions. Or if the car has a little understeer, I can dial in more steering by increasing the steering travel.

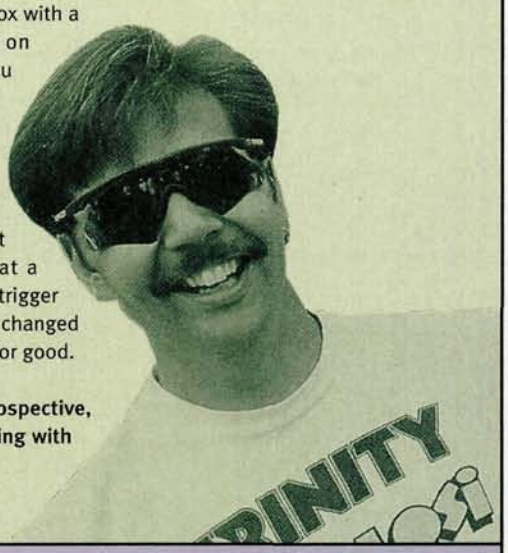
RCCA: So the R-1 design was based on your reccomendations?
JJ: Not just mine; all I can say is that the people at JR must keep an excellent notebook. Every single improvement that I suggested—as well as other suggestions from racers I know—has shown up on the R1 transmitter.

RCCA: Any particular new feature you'd like to point out?
JJ: The most notable for me are progressive steering spring rate—the spring tension gets stiffer the farther the wheel is turned—and a more accessible stopwatch button. I actually attached a piece of G-10, the stuff shock towers are made of, to the button on my R-756 so I'd be able to use the stopwatch. The placement of the button on the R1 is much better.

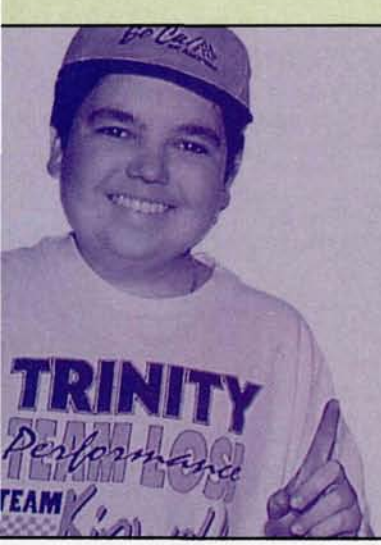
I also like that the antenna is now black-anodized. This will keep it from sticking, which usually results in a bent antenna. There's a more ergonomic feel overall; the steering wheel and trigger placement have been repositioned for a more natural feel when holding the transmitter, and the grip is also a little larger now and seems to better fit American-size hands like mine.

RCCA: Which adjustments do you find yourself reaching for most often?
JJ: The two adjustments that I probably use the most are the brake travel and the steering rate. On the R1 transmitter, these can be set up to be adjusted with a thumb wheel. When I go out and run in a qualifier after I have been waiting around for hours for my heat to come up again, the track conditions sometimes catch me by surprise. If the car has a little too much steering, I can simply spin the thumb wheel and adjust the steering to the current track conditions. Or if the car has a little understeer, I can dial in more steering by increasing the steering travel. I will also adjust the amount of brake travel that the transmitter sends to the speed control. This adjustment doesn't limit the trigger throw; it only limits the actual signal that is sent. This is a real savior as the traction on the track changes.

RCCA: Were you ever a "stick man"?
JJ: I've never really had a thing for stick radios. Gil Jr. and I were convinced after returning from the 1993 World champs in England that the European drivers had an advantage using sticks. Our theory was that they had much more control over how much brake they were applying; there is much more reverse travel in a stick than there is in a trigger. Convinced there was an advantage, I went out and tried a stick radio. I took a couple of slow laps around the track. At first it was tricky; but it got easier. Once I thought I had the hang of it, I picked up the pace a little. Then I went for it. I tried to take a lap at race speed. This only lasted until I reached the end of the straightaway. While it was true that the throttle stick had a more gradual braking feel, I didn't consider that it was a long way from full throttle to full brake. Let's just say I was surprised my car was still in one piece. It hit the wall at the end of that straight pretty darn hard! The wheel radio just seems more natural to me. My first transmitter was a square box with a wheel on top and a lever on the side—no trigger. You had to cradle the box in your hand so that the lever could be moved up and down on the side of the box. Somewhere around 1981 or '82, the first trigger radio turned up at a track. Once the wheel-and-trigger design caught on, it really changed the car transmitter market for good.



RCCA: Thanks for the retrospective, Jack! We always enjoy talking with you.



BK: Tyree [Phillips, of Novak] told me to try it when I was having radio trouble one time. I tested it in the street in front of my house by driving my car as far as I could until I lost control; the brass trick added another 150 feet or so to my range.

RCCA: How do you like the M8?
BK: It's nice. It's got the same adjustments as the Caliber, but the screen is easier to read and displays more info. The M8 also has a stronger signal, and it feels more responsive; the car seems to react more quickly to input; you can feel it in your hands. I like the 10-model memory, too. My Caliber was always filled up.

RCCA: What have you got stored in your M8 now?
BK: Let's see; my four-wheel, truck, and three or four buggies.

RCCA: Do you do a lot of tweaking from the radio, or do you wrench on the car?
BK: I do it the old-fashioned way; I wrench. Once I've set up my throws, that's usually it as far as radio adjustments go. I might use a little exponential, like 2 or 3 percent, but that's all.

RCCA: You can feel that?
BK: Sure; that's a big difference to me.

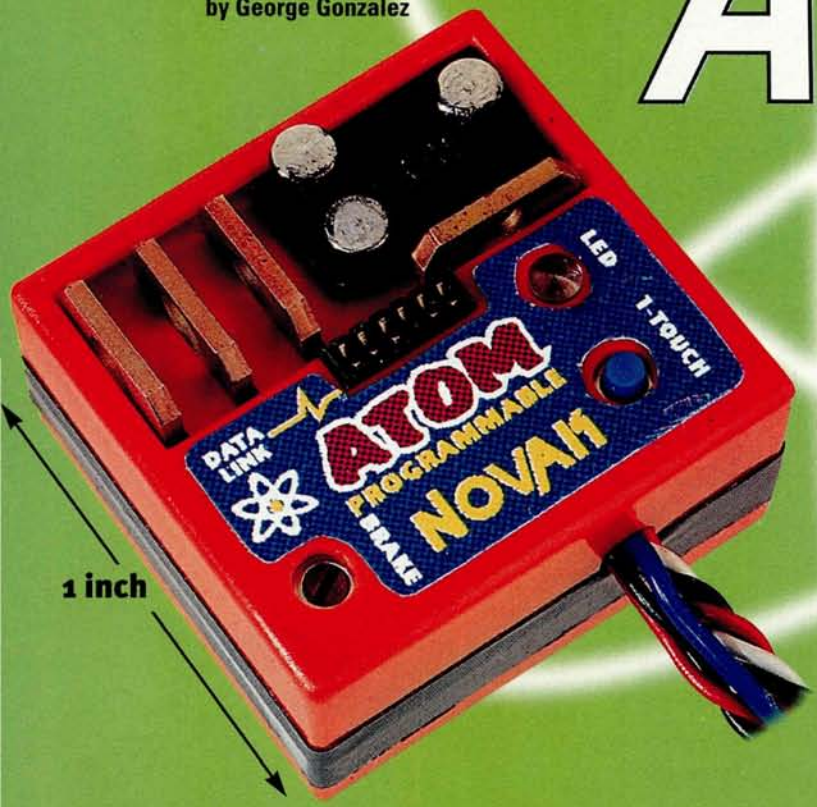
RCCA: Well, you are the 2WD world champ! I feel like a chump for running minus 20 percent on my steering expo—thanks, Brian!

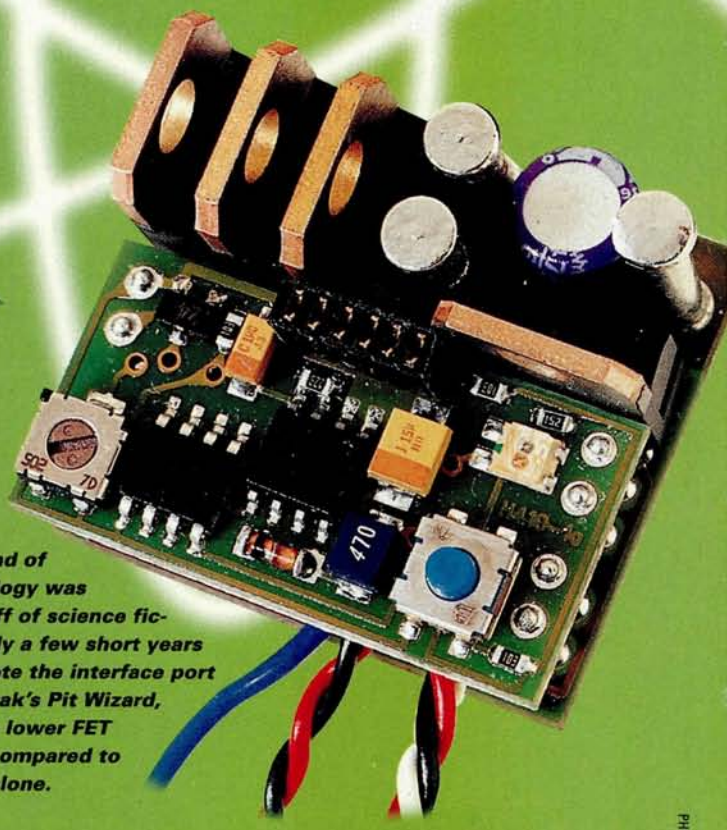
**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

FIRST LOOK!

Novak Atom

by George Gonzalez





This kind of technology was the stuff of science fiction only a few short years ago. Note the interface port for Novak's Pit Wizard, and the lower FET count compared to the Cyclone.

Here's the Atom installed in a Losi Street Weapon. It's smaller than the Sanyo 2000 cell next to it!

PHOTOS BY WALTER SIDAS

GLOSSARY

Neutral: position at which an ESC is at rest, without the application of drive or brake.

Full throttle: trigger position at which an ESC reaches full drive.

Full brake: trigger position at which an ESC reaches full brake.

Deadband: space between minimum brake and minimum drive, with neutral at the center.

Minimum drive: amount of drive applied with the first pulse of transmitter throttle information.

Drive frequency: frequency at which the duty cycle information is sent to the motor (how many times per second the motor is cycled on and off to control its speed).

Brake frequency: frequency at which the duty cycle information is sent to the motor for braking.

Drag brake: a setting whereby the brakes are applied within the deadband space. In other words, the brakes are applied whenever the trigger is returned to the neutral position.

Drag brake value: adjusts the amount of braking within the deadband when the throttle trigger is in the deadband area.

Potent Power Pill

Novak* has addressed the needs of racers who require a more compact electronic speed control (ESC), yet who do not want to compromise on performance, reliability and programmability. The new Atom ESC includes all of the unique racing features and custom programs of Novak's Cyclone, and its small size permits its installation in even the most confined spaces found in today's compact and lightweight R/C vehicles. Even though the Atom was designed for "tight-quarters" installations, it has many universal benefits useful in all forms of racing. Read on; we'll provide you with all the data and show you how this tiny but mighty speedo does its magic.

PROGRAMMED TO WIN

As does the Cyclone, the Atom features three built-in racing profiles designed to suit most drivers' racing preferences. Profile One is designed for stock racing; Profile Two is used when racing heavier vehicles (this profile includes drag brakes); and Profile Three is for modified racing. Each profile is for a specific racing application, but racers should experiment to determine which is right for them.

The Atom also features the Cyclone's hidden Profile Four, which can only be accessed with the company's optional, hand-held Pit Wizard Programmer or Profile Software and Data Link for your PC. These devices allow racers to edit an existing profile or create a custom one by modifying any or all of the following parameters: neutral, full throttle, full brake, deadband, drive frequency, minimum drive, brake frequency, drag-brake value and drag-brake frequency. With this kind of flexibility, racers will be able to create their own custom racing profiles to suit their individual needs. The Pit Wizard and the Profile software include excellent instructions that walk you through programming and explain each parameter in a concise, easy-to-read format.

A few words from the engineers at Novak

"When we design an electronic speed control, we set design parameters such as how wide the deadband should be, what percentage of full drive should be applied with the first pulse of transmitter information, and which brake and drive frequencies to use. In the past, we determined the best possible compromise for these parameters based on various vehicles and driving styles. Although these fixed designs were perfect for some applications and some drivers, they were not right for others. It became clear that a speed control was needed that would allow the driver to modify several of the design parameters to obtain the desired feel.

"With these criteria in mind, we produced the Cyclone and Atom ESCs."

—Novak

OTHER HOT RACING FEATURES

The Atom also includes most of the Cyclone's other racing features, and that makes it suitable for just about any racing application.

- Super-high motor control frequency, adjustable up to 23,400Hz.
- Two hundred and fifty-six separate steps for forward and brake.
- Minimum brake value adjustable from zero to 75 percent.
- Ultra-fast response to change in transmitter signal (fewer than 500 microseconds).
- Error-free operation down to 2 volts.
- Polar Drive Technology and HyperFET III transistors for smooth throttle control, cooler operation and reduced motor-generated radio interference.
- Radio Priority Circuitry maintains control of the vehicle when the battery "dumps."
- Built-in 3A BEC can power a radio system and a high-power servo without an external receiver battery.
- FET servo-boost wire provides switched battery voltage of 7.2.
- Solder posts allow the user to replace the power wires and arrange them so they are as short as they can be.

BEING SMALL HAS ITS ADVANTAGES

You don't have to have a small car to take advantage of the Atom's small size. The Atom weighs in at slightly over 1 ounce without the power wires installed—much lighter than the average racing ESC. This is a great benefit to 1/10-scale oval racers who are always looking for ways to reduce weight. Because of the Atom's size, it could be mounted lower on the chassis in a space that would not accommodate an average-size ESC; this is a major advantage for touring-car racers looking for a way to defy gravity. The Atom is also small enough to be installed so that it counterbalances the weight of another electronic component or a lap-counting transponder—perfect for 1/12- and 1/10-scale on-road racers who require balanced chassis. Off-road racers will find it beneficial for the same reasons.

SPECIFICATIONS

Case size:	1.23 x 1.16 x 0.69 in.
Weight:	1 oz.
Input voltage:	4 to 6 cells
Motor limit:	none
Resistance:	0.0013 ohm
Rated current:	240 amps
Braking current:	80 amps
Minimum brake:	adjustable from 0 to 75 percent
BEC:	6 volts/3 amps
Transistor type/quantity:	HyperFET III (3 forward, 1 brake)
Wire size:	replaceable Super-Flex 14-gauge
Schottky diode:	external
Power capacitor:	external

Accessories: input harness kit with 4 different plugs, 2 Schottky diodes, 3 motor capacitors, 2 power capacitors, decals, adjustment-pot tool, mounting hardware, instruction booklet and catalog.

FINAL THOUGHTS

After reading all this, you may be thinking, "Why buy the Cyclone, if the Atom has most of its hot racing features *and* is smaller?" It's true; the Atom does have most of the Cyclone's features, but the Cyclone has twice as many forward and brake transistors (FETs). This means that the Cyclone has lower resistance, a higher current rating and higher braking current than the Atom. Because the Atom has fewer drive transistors, the brakes may fade slightly under extreme racing conditions or in hot weather; for this reason, Novak insists that you install the included heat sinks whenever you run the Atom in extreme conditions.

The Atom will undoubtedly become a popular choice for those racers who have space constraints, but it should also be popular because of its other merits. If you're looking for a feature-packed, compact ESC, be certain to check out the Atom.

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

HOW TO

Detail Touring Cars

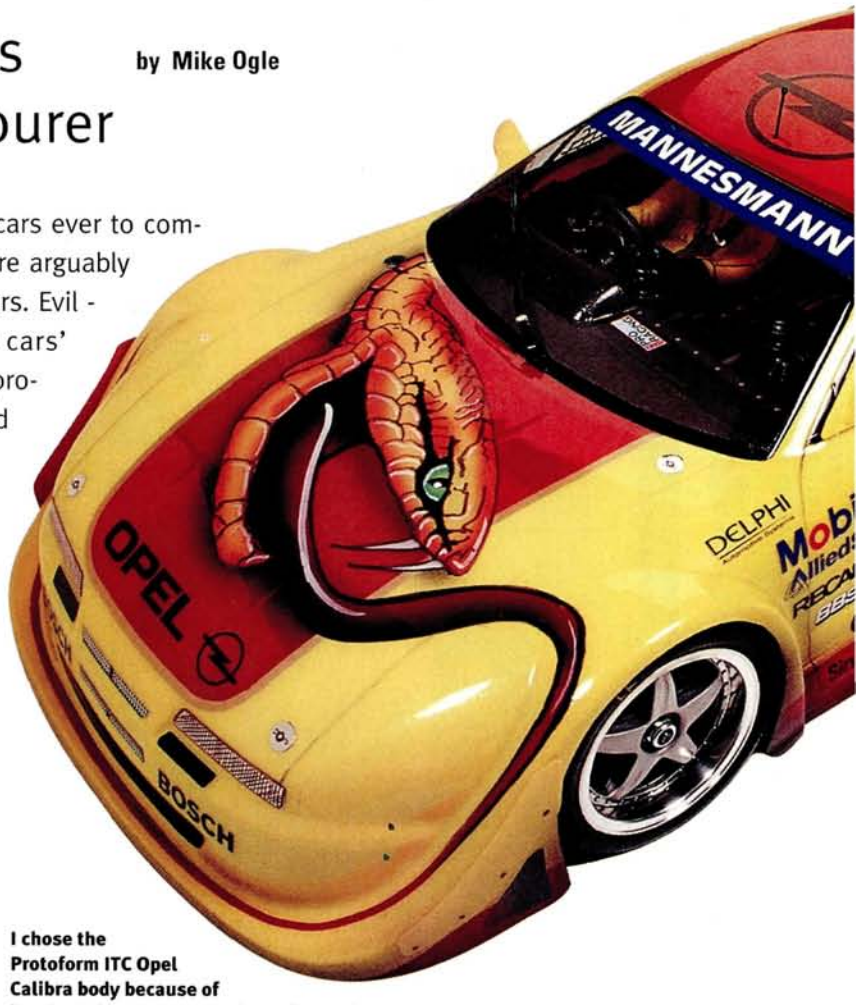
Easy Tips and Tricks to Dress Up Your Tourer

by Mike Ogle

THE MOST PHOTOGRAPHED racecars ever to compete on the Formula 1 circuit were arguably the bright yellow Team Jordan cars. Evil-looking snake-head graphics on the cars' nosepieces, and a largely ornamental promotional staff of yellow-jumpsuited European beauties—also garbed with the same snake graphics—drew the motoring press photographers to the Jordan pits like a magnet.

Meanwhile, in the R/C world, nothing is as hot right now as touring cars. And one of our sport's favorite touring-car bodies is the sleek Opel Calibra; several versions are available from Tamiya*, Parma*, Kyosho* and Protoform*. Looking for something a little different, I decided to try to incorporate the Jordan Team's famous snake graphics and color scheme in a scale touring car ... hence the "Opel by Jordan" on the car's doors. It's a "phantom"—a car that never actually existed but is rather a representation of what the car might have looked like if Jordan had expanded its racing efforts into the late, great ITC racing circuit.

Many small, easy detailing tricks went into this car; most cost less than 10 bucks each and all can be accomplished by almost anyone. So break out the Lexan, and let's get detailed!

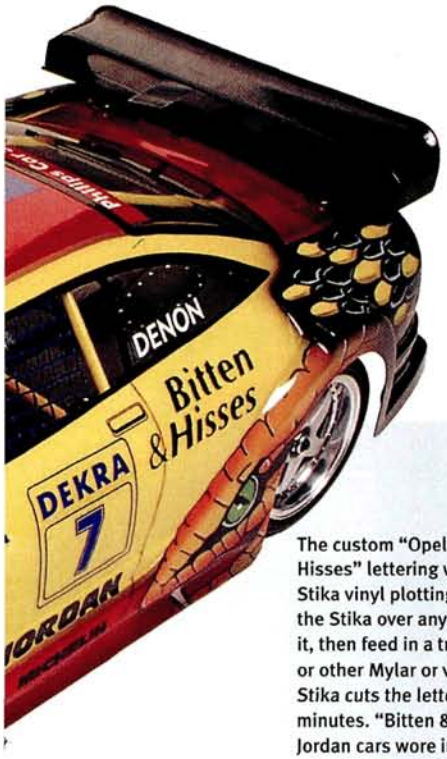


I chose the Protoform ITC Opel Calibra body because of its sleek lines and tapered rear fender flares—a perfect place to incorporate the Jordan snake graphics. I simply enlarged a photo of the Jordan F1 car's nosepiece on a photocopier until it roughly matched the size of the Opel's fender flare. Next, I traced the photo on the inside of the clear body with a permanent Sharpie-brand marker, let it dry for a few minutes, then masked it off with automotive masking tape before spraying on the main body color.

If you really want to go for realism, just remember that racecars do get dirty. I airbrushed some simulated brake dust around the wheel wells with thinned-down flat black paint. If the thought of intentionally dirtying your new paint job makes you cringe, just look at these pictures. You'd be hard pressed to convince someone that they're not photos of a real car.

Pro-Line offers these super-trick, drilled, disk-brake rotors (part no. 6200) for its onroad, semi-pneumatic conversion wheels. To get them to fit the standard touring-car wheels, I had to grind out the shaded area with my Dremel and then Shoe-Goo the disks to the backs of the wheel's spokes. These great-looking narrow wheels are Kawada's TU-35P VXs, with chrome rims and satin-finish spokes. As an added detail, I simulated yellow chalk marks on the tires with a fine brush and some thinned flat-yellow paint.

Chrome hood-pin fittings are easily simulated by using a regular paper punch to pop out perfectly round pieces of chrome, self-adhesive MonoKote. This material is readily available in the R/C airplane section of your local hobby store. The headlights were trimmed out of reflective, iridescent tape, then "lens lines" were drawn on with a fine-point permanent marker. When racing in the sun, it sometimes looks as if the car's lights are flashing!



The custom "Opel by Jordan" and "Bitten & Hisses" lettering was made with Roland's* cool Stika vinyl plotting and cutting machine. Just roll the Stika over any crisply defined graphic to scan it, then feed in a trimmed-down piece of MonoKote or other Mylar or vinyl self-adhesive material. The Stika cuts the letters out for you in just a couple of minutes. "Bitten & Hisses," by the way, is what Jordan cars wore in place of "Benson & Hedges" when they raced in countries that banned advertising of tobacco products.

The Parma universal interior is vacuum-formed white styrene plastic, not Lexan, so it is painted with an enamel paint meant for static kits. For the most realistic appearance, be sure to use the "flat," no-gloss colors, especially when painting details such as the cloth of the driver's suit. If you can't find the colors you need in a flat formula, Testors* also sells spray cans of "Lusterless"—a dull finish, clear lacquer overcoat. Of course, the Parma universal interior got a liberal application of the same Slixx carbon-fiber decals; here they simulate a carbon-fiber dash. All the little round silver rivets are easily produced with just one touch of a Pilot-brand, silver, fine-point marker. Another great, inexpensive detailing product is this molded, one-piece driver head from Factory Works*. The level of detail is really astounding. For a serious concours entry, you gotta go with one of these. I painted the driver's helmet with bright red fingernail polish to simulate the molded-in gelcoat color of some fiberglass helmets. It finishes great, is high gloss and dries in 10 minutes. Can't beat it!

The rear spoiler was pirated from a Tamiya Alfa Romeo kit, then covered with strips of Slixx carbon-fiber/Kevlar-simulating decal sheet (no. 1056/95CF). Though designed for 1/24-scale model cars, the decals still look pretty good as a simulation of finely woven carbon-fiber components in 1/10 scale.

The last time I wrote a body-detailing article, I really had to work at finding something to make racing exhaust pipes out of. Now, thanks to RPM*, you can just buy these simulated tailpipes complete with their own mounting brackets. This is their "Fatboy" single large pipe. It's a very clever, inexpensive detail item that really adds to the looks of any touring car.

PHOTOS BY MIKE OGLE AND WALTER SIDAS

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FASTER fangs!

NOBODY CRAVES a horsepower advantage like the guys who duke it out in the stock classes. If a driver is capable, just a little extra "grunt" can help his or her car run away from the field. Of course, the whole idea of stock class racing is that no one has a real motor advantage; that's the *idea*, but everyone wants that extra edge over the competition. From the look of Trinity's* latest stock powerplant, it has the edge you're looking for!

Trinity's original Midnight was a sensation when it was released last year, so it's little wonder that Trinity would trade on its success by calling the new mill "Midnight 2." Don't think for a moment that the "2" represents only a few minor tweaks from the first Midnight; only the bushings, springs and spring posts are carryovers from the original motor. Everything else is radically new.

WHAT IT ALL MEANS

Don't worry if you feel a little dazed by all the new stuff Trinity has built into the M2; there's a lot to digest! We contacted Neal McCurdy, Trinity's head motor man, for the lowdown on what the Midnight 2 will be able to do for you next Sunday.

R/C Car Action: *The stepped "Z-Speed" armature and LCG can design are pretty unconventional. Are you sure the Midnight 2 is ROAR-legal?*

Neal McCurdy: Yes! The Midnight 2 is completely legal under current ROAR rules. We've worked hard to produce the most advanced motor we could within those rules.

RCCA: *What does the Z-Speed armature do for the racer? Does it actually alter the timing of the motor?*

NM: The Midnight 2's timing—the position of the endbell on the can—is fixed, as is the case with any stock motor. However, the timing is what I would call "dynamically variable"; the Z-Speed armature offsets the pole slightly because of its step design, and this causes the magnetic field around the arm to change depending on the energy being delivered to the motor. In the case of the Midnight 2, this allows the motor to produce a lot of low-end torque without compromising top-end rpm. The stepped arm also moves more air than a conventional design, which helps keep the motor cool; that also helps torque, especially at the end of a run.

RCCA: *How does the LCG can design benefit racers?*

NM: The flat area of the can is the space between the magnets. The flats bring the wall of the can closer to the armature, increasing the strength of the magnetic field and giving the motor a little extra torque. The LCG design also reduces the motor's profile by a few millimeters; to exploit this, we'll be producing new motor plates for Trinity cars that will lower the motor in the car—hence the abbreviation LCG, or low center of gravity. We'll probably produce the motor plates for Associated cars, as well.

The dyno-tuned Midnight 2 Pro features Trinity's new "E" brush, with a silver content formulated just for stock motors. A reusable motor tube and dyno sheet are included.

RCCA: *Which type of racing is the Midnight 2 best suited to?*

NM: It's a good all-around motor, but its low-end punch makes it ideal for off-road. It's also a good touring-car motor, as these vehicles are close to the off-road cars in weight and, like the off-roaders, they need to squirt quickly from corner to corner. Any racer who needs torque will want a Midnight 2.

RCCA: *Do you think racers will be gearing their cars differently for the Midnight 2?*

NM: Not if they've been running a Midnight. We didn't want the gearing of the cars to change; the Midnight and the Midnight 2 are very close in rpm, but the Midnight 2 produces more torque.

RCCA: *Any speculation on the future of stock-motor technology?*

NM: Every year, it seems as though we've reached the edge of the envelope, and it's difficult to go beyond that edge. I think the Midnight 2 is definitely a step beyond, and it will be a hard act to follow. Unless there's a rule change, the Midnight 2's design should represent the pinnacle of stock-motor design for Trinity, at least for a few years.

RCCA: *Thanks, Neal! We're looking forward to testing the Midnight 2 soon.*

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

We were very curious to see what kinds of numbers the Midnight 2 would deliver on the dyno; after all, the original Midnight was no slouch on the track. Do the new features really make a difference? We pitted the original Midnight against its successor so we'd be able to see for ourselves. The numbers never lie ....

Midnight 2

Rpm	Torque	Watts	Amps
23,787	1.3	23	10
19,170	5.7	81	15
16,730	8.6	107	20
14,809	10.4	115	25
13,382	11.9	118	30
12,107	12.9	115	35

Midnight

Rpm	Torque	Watts	Amps
23,002	1.1	21	10
18,423	4.7	65	15
16,443	8.3	100	20
14,710	10.2	111	25
13,345	11.8	115	30
12,080	12.7	113	35

GET UP TO SPEED WITH ....

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YOU'VE COME TO THE RIGHT PLACE!

Have you always wanted to know what really goes on behind the scenes on the racing circuit? Have you always wanted to understand what makes a top racer tick: how he stays motivated; why he chooses the gear he does? Did you ever want to peek inside the genius skull of an industry design wizard? If your answer to any of these questions is "Yes," well, you've come to the right place!

Welcome to "Racer News"—the final say on the latest racing info. Here, every month, you'll find all the latest "dirt" in the racing world, scoops on hot products, interviews with industry leaders, the latest race results, top driver profiles and much, much more!

INNOVATOR AT WORK

Gil Losi Jr. should be a very happy man. Why? Well, let's take a look at a few of the events that have happened over the last year and a half that have made Team Losi more successful than ever.

- The successful launch of a brand-new 4WD off-road buggy (a car that won the '96 ROAR 4WD national title its first time out with Brian Kinwald at the wheel).
- The Double-X 'CR,' XX-4 and Double-XT 'CR' won titles at the '96 ROAR Mod Nats.
- Brian Kinwald TQ'ed and won every class at the '97 ROAR Mod Nats with Losi cars and trucks.

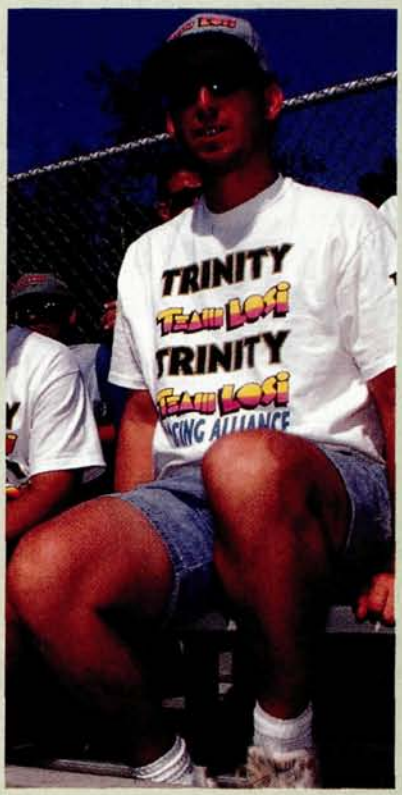
- Brian Kinwald took home Losi's first 2WD IFMAR title at the IFMAR Worlds in Pomona, CA.
- If that wasn't enough, Brian Kinwald went out and TQ'ed and won every class at the '97 NORRCA Off-Road Nats and at the Pro-Line Endless Summer as well.
- Team Losi released its Street Weapon sedan (based on the Nats winning XX-4) and so far, this car appears destined to carry on the company's winning tradition.

As you can see, Team Losi has been very busy. Let's talk to Gil Losi Jr. and see what he has been up to as well as what the future has in store for Team Losi.

R/C Car Action: Congratulations on all your successes; 1997 must have been your best year ever. Brian Kinwald dominated the ROAR Mod Nats and the NORRCA Nats and helped earn your company its first IFMAR 2WD title. Did you expect your team to be so successful?

Gil: In racing, you can't use words like "expect." We have a very strong team and have spent a great deal of time working with the Double-X and Double-XT. Having the chance to work with these vehicles and develop setups over an extended time, we have been able to familiarize ourselves with the changes that need to be made in setups to adapt to various track conditions. I feel that our knowledge of and familiarity with the vehicles, combined with the talent of our entire team, have made the difference in our race results this past year.

RCCA: We all know that Brian is the dominant force on the off-road circuit, but do you see any up-and-comers who might challenge him in the near future?



Gil: Brian has the advantage—as well as disadvantage—of being the number-one driver. He has a great supporting cast in the rest of the Losi team at the races, but he also has the added pressure of knowing that everyone is out, not only to win the race, but also to try to beat him. Brian Dunbar, Greg Hodapp, Scott Brown, Gabe Boudreau, Matt Francis and now Mark Francis all play a big part in every race that Team Losi is fortu-

RACER news

INNOVATOR AT WORK

nate enough to win. Any one of these drivers could win any race that he attends. Just take a look at the A-main results over the course of the past year. You'll see all of their names in nearly every A-main event.

RCCA: Which new products can we expect to see from Team Losi in the near future?
Gil: Our main objective is to get more racing experience with the XX-4 and Street Weapon cars. As a result, I'm sure we will release more tuning parts for these vehicles. In addition, we have released a new softer Red compound for our off-road tires. We have also developed special White and Blue compounds for our touring-car tires. I imagine that we will also produce some new tread patterns for both on- and off-road cars to take advantage of these newer compounds.

RCCA: Let's talk about the Street Weapon for a second. From our experience with the car, we found that it's very dialed right out of the box; you must be happy with the car's performance. Are we going to see anything new in that arena from you anytime soon?
Gil: I'm sure that as we find new setups and learn more as we race the car during the next few months, we will release some new accessory or tuning parts for the Street Weapon. These parts will probably include sway-bars, springs and new wheel styles with different looks.

RCCA: Most racers see you at the big races and find you easy to approach and get along with. But few get to see what you like to do in your "off" hours away from the track. What are you involved with away from R/C?
Gil: Well, I have a 14-month-old baby boy—Michael. He's great! I never imagined being a father could be so wonderful. I also spend a lot of time with my wife, Julie. Once I finish with all of my family duties and clean the yard up on weekends, I like to get away and mountain bike. For me, mountain biking is a great way to relax and forget about anything that might be bothering me.

RCCA: Any advice for racers who are looking to take their racing efforts to the next level?
Gil: You've heard it a million times before: practice! Pay attention to how changes in setups affect the way a car or truck handles. If you get a chance to see any of the top racers at the track, you'll notice that they all carry notebooks in which they record all of their notes on how setup changes affected the handling of their vehicles and under what track conditions.

RCCA: Good advice! Thanks for your time, Gil. We wish you and the crew at Team Losi continued success both on and off the R/C circuit.

Li'l Gil.

Speed Shop

Losi **Slipper Mod**

Here's a quick performance tip for your Double-X 'CR' and Double-XT 'CR' off-road vehicles:

When racing on smoother tracks, many racers remove the Losi Hydra Drive unit to reduce rear-end weight. The only problem is that the slipper clutch alone does not provide enough range of adjustment for those incredibly intuitive racers. Team Losi/Team Trinity factory driver Brian Kinwald would like to pass along a little tip that will most certainly make your vehicle faster. For around $12.50, you can add a double-pad slipper-clutch system like the one used in the XX-4 and remove the Hydra Drive altogether.

THINGS YOU'LL NEED

- **One additional slipper pad—part no. A-3123.**
- **One additional slipper backplate—A-3122.**
- **XX-4 84-tooth spur gear—A-390 (you can choose any XX4 spur to suit your track).**

You'll also need the original backplate and slipper pad installed in the tranny, both the front and rear spring spacers, the tension spring and nylon locknut. The thrust-bearing assembly will not be used.

THE CONVERSION

Assemble the double-slipper-clutch system in the exact sequence shown above. When the unit is in place, you'll need to do a little experimenting to find the setting that best suits the track you plan to race on. The double-pad setup allows a looser setting than usual, as there is more surface area on the two pads for the clutch to engage. One thing you'll notice for sure is that the unit will now provide a much broader range of adjustment. Give it a try; we think you'll be happy with the results.

Here's the completed double-slipper-pad clutch for the Double-X and Double-XT vehicles.

TEAM ASSOCIATED B2 to B3 CONVERSION KIT

At a glance, the differences between the Associated* RC10B2 and the B3 may not be too apparent; in fact, they are very subtle. But take the time to study both cars, and you'll soon appreciate that the differences are monumental. The B3 features Associated's new Quadra-Symmetric suspension; unlike the long front/short rear arm setup of the B2, the front and rear suspension arms are of the same length, and the front and rear inner and outer hinge pins all pivot on the same plane. The new suspension design was created to work equally well on smooth tracks and bumpy ones. The car is also more adjustable, but not so adjustable that it could easily be dialed out. Here's what you get with the B3 Conversion Kit.

Your car will be up to the latest factory specs, and you'll also have more adjustment possibilities.

- **New front bulkhead has an extra hole that is used to secure the front shock tower. The area around where the hinge pins are usually inserted has also been beefed up considerably.**
- **New front shock tower has several geometry changes and an extra mounting hole to mate with the extra hole in the new front bulkhead.**
- **New shorter and stronger ball cups and front turnbuckles.**
- **New, symmetrical, front suspension arms.**
- **Beefier caster blocks and steering blocks.**
- **New front aluminum axles.**
- **New front kingpin with attached ball that allows the use of a slightly longer upper camber link.**
- **New chassis top plate has provisions for mounting an optional front roll bar.**
- **New chassis has extra mounting holes toward the rear bulkhead area to accommodate an optional rear roll bar.**
- **New rear suspension arms and new rear axle carriers increase rear width of the car.**
- **New slipper assembly with more torque capacity, larger diameter pad and computer-optimized plates—for smoother operation.**
- **New 2.2-inch front wheels.**

As you can see, the B3 Conversion Kit contains a ton of parts. At a list price of $99 (composite material), some may think it's little costly. But, when you consider all the standard parts you get along with a new chassis, the conversion kit's asking price starts to look mighty attractive. The best part, however, is that your car will be up to the latest factory specs and you'll also have more adjustment possibilities. For those who would like to shed some weight, the B3 Conversion Kit is also available in molded graphite.

B3 Conversion Kit —part no. 9022 (composite) $99; 9023 (graphite) $130.

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.*

RACER news

RACER PROFILE BRIAN KINWALD

In our first "Racer News," we are delighted to profile the incredibly accomplished Brian Kinwald. The dominant off-road racer in 1997, Brian shows no signs of slowing down as the '98 season unfolds. So without any further ado, let's kick back with Kinwald.

VITAL SIGNS

Age: 24.

Sponsors: Team Losi, Trinity, Novak, Airtronics, Lunsford, MIP.

Years involved in the hobby: 8½.

First R/C car: "Well, I wanted a Tamiya Frog. I liked it because it had two antennas. But when I sent my dad to the store to get it, he got the wrong car, so, my first car was an AYK Buffalo."

Closest competitors: Mark Pavidis, Masami Hirosaka, Greg Hodapp.

Favorite racing class: 2WD Modified.

Favorite track: Intermountain R/C Raceway in Magna, UT.

Favorite race: every race.

Number of titles: two world titles, 23 national titles and over 100 major event titles.

R/C Car Action: 1997 was your best year ever. You just flat out dominated. What is the key to your success?
Brian Kinwald: It's a combination of everything that goes into racing—practice, obviously. Also, every year Losi cars get better and better.

RCCA: How instrumental are you in R&D at Team Losi?
BK: I would have to say that I am the main tester. When Gil Junior comes up with a new idea—unless his idea is really out there—he usually has me try it first. If it's an off-the-wall idea or something completely different, Gil will usually test it first. Once he is a little more comfortable with the new idea, he will pass it on to me or go to the track with me to have me try it.

RCCA: What other hobbies or interests do you have besides R/C?
BK: When I get a chance between races, which isn't very often, I like to bowl and golf.

RCCA: If you only have an hour to prepare for a race at a track you've never been to before, how would you spend that hour?—setting your car up for the track conditions after a few test laps, or practicing with your existing setup?
BK: First, I would run one battery through my car to get used to the track layout. Then I would watch what everybody else's cars were doing for the rest of the hour and make adjustments to my car to correct the problems I thought the other cars had with the track.

RCCA: Tell us what it's like to be a sponsored R/C driver. A lot of racers think that it's all fun and games and free stuff. It's a lot of work, too, isn't it?
BK: It's a lot of fun when there isn't much pressure, but the pressure of the big races—only two or three times a year—can take some of the fun out of it.

RCCA: How often are you on the road—or in the sky—as a factory driver?
BK: it all depends on the race schedule. Sometimes, it's one race after another; sometimes, I'm off for a month.

RCCA: What was your worst airplane meal?
BK: That's a tough one. I couldn't tell you; there have been so many!

RCCA: OK; airplane food is a low point! Any other "bests" or "worsts" of the factory driver's life?
BK: Being away from home so much is probably the worst part of it, but I get to hang out with my friends from racing, and that's probably the best part.

RCCA: We had to call you at M n M Speedway to get in touch with you; are you always practicing?
BK: I don't usually practice in the sense of running pack after pack to get driving time in. I get plenty of track time when we're testing car setups, and club racing is also practice for me. Around here [Southern California] you can race four times a week if you want to.

RCCA: Brian Kinwald at a club race? Do they make you run an old Mabuchi 380 motor to keep things fair?
BK: Ah, no; but thanks for the compliment! A lot of factory guys are local, so it's not like that at all. Every night's the nationals.

RCCA: Do you feel less pressure at a national event because you race most of the same guys each week?
BK: It helps, but there's always more pressure at a big race; *everybody's* there, and a lot is at stake.

RCCA: Where is your head during a race? Is it moment-by-moment concentration, analytical strategizing, or something entirely different?
BK: It depends on the race; if there's a pileup in the first turn, I'm thinking about how to get around it—or whatever it is I need to do. If I get out in front, I'm concentrating on not making mistakes or giving a passing opportunity. If I'm in the pack, I'm thinking about how to catch up.

RCCA: Would you rather lead from the buzzer, or come from behind for the win?
BK: It's more exciting to catch up and win, but all I care about is crossing the line first!

RCCA: What's it like to walk into a hobby shop or read *R/C Car Action* and see your name and face all over motors, parts and cars?
BK: That was weird at first, but you get used to it.

RCCA: When you go to bed at night, do you have dreams about racing?
BK: No! [laughing].

RCCA: What advice would you give a novice or intermediate racer who is trying to improve?
BK: Ask a lot of questions, learn from the other racers, and practice. That's all that's really important.

RCCA: You didn't say "Spend a lot of money."
BK: That's right. Sure, you need to have a certain basic level of competitiveness in your equipment, but you don't need pro everything to win a club race—just skill.

RCCA: I can buy a Kinwald XX 'CR,' a D3 motor, a Novak Cyclone and all the other gear you use, and you'll still kill me on the track. What kind of "works" parts do you use to win?
BK: Nothing, really. Tire choice is important, but anybody can buy Losi tires. Proper setup is key, too, but that's just a question of taking the time to get the car sorted out. It's not about parts. The best hop-up you can get is track time.

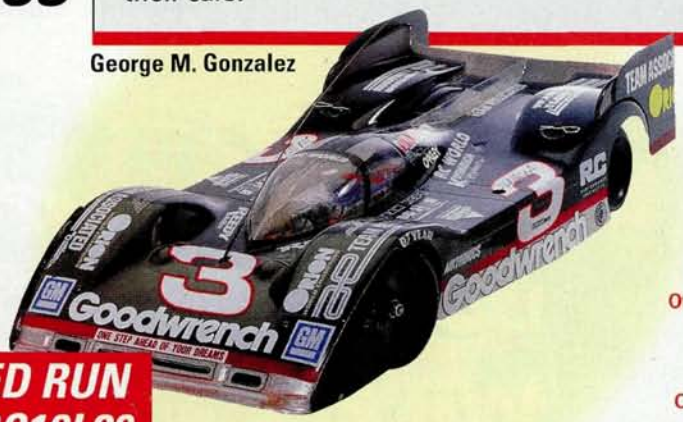
RCCA: We thought you'd say that! Thanks for your time, Brian. We wish you continued success! ■

Championship-

Dial in your car like the pros

It takes a great deal of talent and a lot of hard work to win a major championship. Any champion will tell you that the key elements to success are knowing how to set up a car properly and frequent practice. Although we at *R/C Car Action* can't practice for you, we can do the next best thing: we can show you how the champions set up their cars.

George M. Gonzalez



Sponsors	Associated, Team Orion, Jaco, Protoform, Airtronics, Du-Mor, Kimbrough, Robinson, Oakley and Aveox
Age	40
Occupation	R&D manager for Associated Electrics
Hometown	Foothill Ranch, CA
Years racing	11
Other interests	spends most of his free time with his wife, Sonya, and his son, Noah; also enjoys mountain biking and fishing.
Championship	NORRCA Winterfest Super Oval
Class	Insane Speed Race
Record average speed	94.21mph

CLIFF LETT'S INSANE SPEED RUN ASSOCIATED RC10L20

Cliff Lett pushed the speed envelope once again with his prototype RC10L2O. At the previous Insane Speed Race, tire wear was by far the biggest obstacle racers had to overcome. There just wasn't a capped tire available that could withstand the extreme cornering forces (and the extreme rpm) that a single lap—at speeds higher than 90mph—dished out. To prevent the cars from becoming airborne, suspension setup and aerodynamics also had to be considered.

Cliff learned a lot from the previous event and, based on his experiences, built an all-new prototype. He acknowledges his appreciation of the following people, who contributed immensely to his success: Jack Rimer of Jaco, for introducing the incredible new "V"-rated high-speed capped tires just in time for the event; Dale Epp from Protoform, who helped Cliff create the Nissan GTP body with jet-fighter-like characteristics; and Philippe Neidhart of Team Orion for pushing, matching and cycling the cells to a new level of high performance.

SETUP

■ Associated Dynamic Strut front suspension with trailing axles and longer, RC10B2 inner front hinge pins to increase suspension travel. A 2-stage spring system—made up of a Wolfe Motorsports* Purple (stiff) progressive spring with an inner, Associated .020 1/12-scale spring mounted on each kingpin—can handle 25 to 30 pounds of downforce before the suspension bottoms out.

■ Two small Delta* shocks provide additional damping and prevent the front end from bouncing at high speeds. The system worked so well that Cliff ran a similar setup on his 4-minute car.

■ Cliff's Associated RC10L20's custom graphite chassis is longer and wider than stock; 3 graphite reinforcement planks have been laminated to the graphite material to prevent it from flexing.

■ A Futaba* FP-R113F FM receiver and 5-cell, 60mAh receiver battery pack are mounted on the front bumper to keep them as far as possible from the motor and batteries.

■ An Airtronics* 94737 servo equipped with a Kimbrough* servo saver and RCPS* titanium tie rods handle the steering chores.

■ Jaco's* new "V"-rated capped tires were able to withstand run after run without showing any signs of wear. In fact, Cliff used only one set of tires for all of his practice runs and time trials.

■ Twenty-six matched Orion* V-Max 1000mAh cells, assembled in stick packs without battery bars or tabs. Cliff saved several ounces by using 1000mAh cells instead of the 2000mAh cells more commonly used in R/C. The battery pack also helps to stiffen the chassis.

■ Associated .56-stroke Team Shock with an older RC500 "stiff" spring and Associated 80WT silicone shock oil. Cliff also installed an RCPS shock bladder to separate the air from the oil inside the shock body.

■ Stock L20 motor pod, T-plate and diff/axle. To provide more suspension travel, the upper pod plate has an extra shock-mounting hole farther back.

■ Once again, Cliff used Aveox* brushless motor power. He decided to continue using his tried-and-true analog speed control, rather than experiment with the company's newer digital units.

■ Lexan body supports help prevent the body from caving in under the pressure of extreme downforce.

OTHER SPECIFICATIONS

Left front caster:	14 degrees negative
Left front camber:	0
Right front caster:	14 degrees negative
Right front camber:	2 degrees negative
Toe-in/out:	0
Gearing:	2.34:1
Radio:	Airtronics Caliber 3PS
Body:	Protoform* Nissan GTP that has been narrowed, reinforced and aerodynamically reconfigured by the master himself, Dale Epp.

Winning Setups

Featured are Team Trinity* factory driver Kirby Hand's ROAR Carpet Oval national-championship-winning Switchblade 10, and Team Yokomo driver Brent Wallace's NORRCA Road Course national-championship-winning YR4M-2. As a bonus, we've also included Cliff Lett's NORRCA Insane Speed Race record-holding Associated* RC10L2O. Here's your chance to see what evil lurks under the hoods of these championship-winning cars and exactly how they're set up.

KIRBY HAND'S

TRINITY SWITCHBLADE 10

Kirby Hand began his racing career on the dirt—dirt oval, that is. After racing for several years, he and his brother, Ryan, decided to try pan-car racing and purchased an inexpensive Bolink* oval car. From that point on, Kirby took control of the wheel while Ryan took control of the wrench, and a Nats-winning team was born. Kirby has won many titles, including a first-place finish in the 1/10-stock class at the Trinity Oval Shootout at King R/C raceway and two recent national championship titles at the ROAR Carpet Oval Nats. Kirby is now sponsored by Trinity; his talent has taken him to an entirely new level, and you'll be hearing a lot more about him in the future.

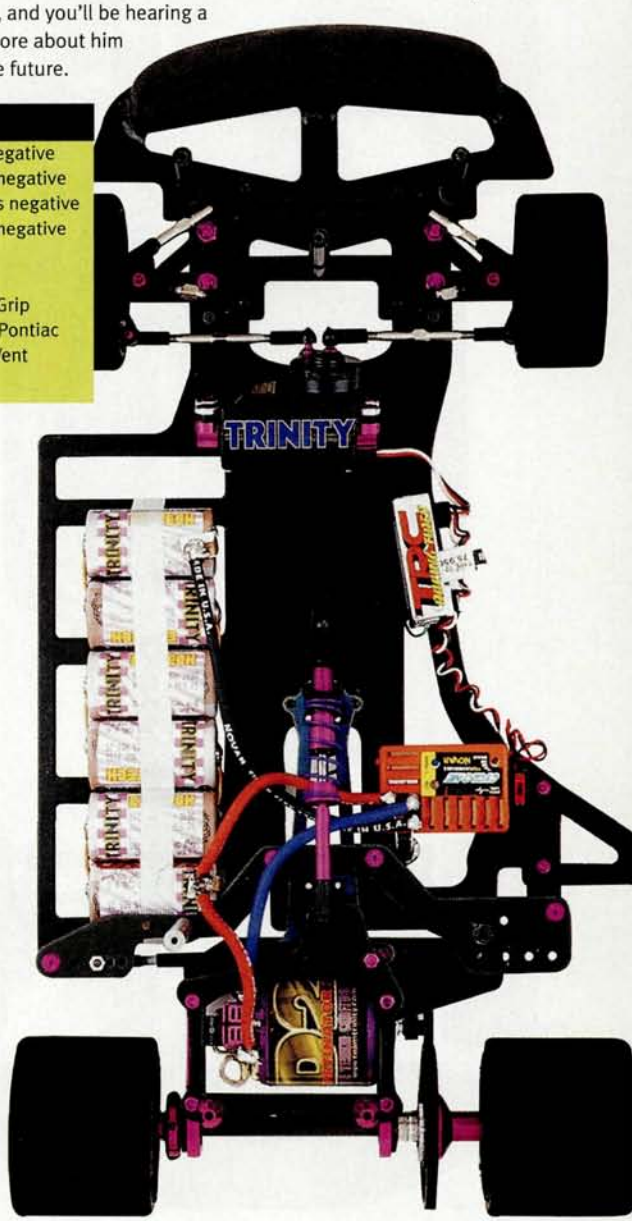
SETUP

- TRC* Blue compound left and right foam front tires.
- TRC White compound left and right foam rear tires.
- Experimental front suspension consisting of Switchblade 10 molded lower suspension arms with an Evolution 10 Reactive Caster upper top plate; in-line axles with .20 springs on both left and right kingpins, with the right roll center set on medium and the left roll center set on high. To aid damping, Kirby also used Trinity Purple Stuff on the front springs.
- A Futaba 9102 miniservo easily handles the steering chores.
- A Novak* Mercury 75MHz FM receiver mounted on its side for easy crystal changes.
- A Novak Cyclone ESC with custom programming is Kirby's number-one choice for oval racing.
- Trinity GM VIS Sanyo R/C 2000mAh cells mounted as close to the chassis' centerline as possible.
- Trinity D2 12-turn triple-modified motor.
- Stock rear damper set up with 60WT oil and a purple spring.
- Trinity Zero Friction 128-tooth, 64-pitch spur gear mated with a 25-tooth Zero Gravity pinion gear (5.12:1 final gear ratio).
- Trinity standard graphite rear axle and diff.
- TRC spring-steel T-plate.
- Stock damping tube set up with Trinity Red Stuff.
- Trinity lightweight purple-anodized left and right rear hubs.
- Trinity lightweight purple-anodized motor mount.
- Trinity lightweight purple-anodized left axle carrier.
- Trinity Switchblade graphite chassis made as light as it can be by Ryan Hand.

Kirby's car is also decked out with Trinity lightweight purple-anodized aluminum screws and Lunsford* Punisher turnbuckles. For aesthetic reasons, Kirby removed all the lead weights from the chassis; normally, strategically mounted weights would be visible. Ready to run, his car weighs 2.65 pounds.

OTHER SPECIFICATIONS

Left front caster:	1 degree negative
Right front caster:	2 degrees negative
Left front camber:	1.5 degrees negative
Right front camber:	2 degrees negative
Toe-in/out:	0
Ride height:	Low, baby!
Traction compound:	Trinity Zip Grip
Body:	Bolink '97 Pontiac
Wing:	Trinity Tri-Vent
Radio:	Futaba 3PJ



Sponsors	**Trinity, Novak, Futaba, Bolink, TRC, Lunsford, BRP and Protoform**
Age	**19**
Occupation	**student**
Hometown	**Tower City, PA**
Years racing	**7**
Other interests	**video games, hockey, soccer, NASCAR and IRL racing.**
Championship	**ROAR Carpet Oval Nats**
Class	**1/10-scale Modified**

SETUP

■ Prototype graphite shock tower designed to accommodate larger-capacity shocks.
■ Associated .56-stroke Team Shocks equipped with Team Losi no. 60 pistons, Yokomo 600WT shock fluid and silver springs (550WT oil in rear shocks).
■ To limit up-travel, two orange O-rings are installed on the shock shafts, outside the shock bodies.
■ Team Suzuki machined aluminum front-suspension arms.
■ Team Suzuki 3-degree machined-aluminum caster blocks provide more on/off power steering.
■ Pro-Line* S3 low-profile slicks mounted on Warlock wheels (front and rear).
■ Prototype graphite rear shock tower.
■ Team Suzuki machined-aluminum rear hubs.
■ To stiffen the chassis, five aluminum posts are installed between the main chassis and the top plate. To further reduce chassis flex, the center belt tensioner is set up to be as stiff as it can be.
■ Maxtec* Shock Wave 10-turn double motor.
■ Maxtec V-Tec Platinum voltage-increased Sanyo R/C 2000mAh cells, mounted offset on the chassis; right saddle pack mounted as far back as possible, left side mounted slightly more forward.
■ Novak Cyclone programmable ESC.
■ Novak Mercury FM receiver.
■ 9402 steering servo with Hangar Nine* machined aluminum servo horn.
■ MIP* Shiny CVDs (front and rear).
■ Lunsford titanium tie rods throughout.

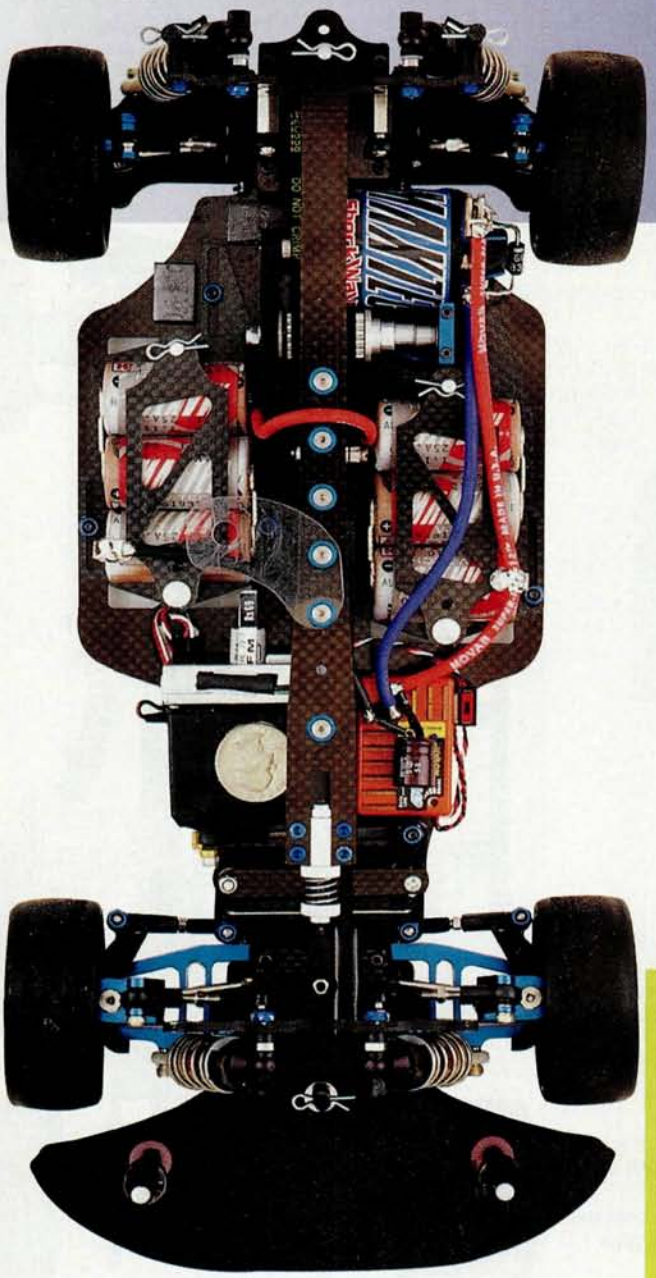
BRENT WALLACE'S

YOKOMO YR4M-2

Brent Wallace is well known around the 4WD off-road racing circuit. His Yokomo vehicles are always fast and extremely competitive. He is proud of his second-place finish at the ROAR Off-Road Nats and his first-place finish in the Invitational Class at the Reedy International Race of Champions. Because of his busy work and study schedules, Brent has to seek out opportunities to get to the track. When he can commit to practice, though, it's always quality time.

OTHER SPECIFICATIONS

Camber (F/R):	1 degree negative
Front toe:	1 degree out
Ride height (F/R):	6mm/8mm
Gearing:	19/81
Body:	Protoform Volvo S40



Sponsors	Yokomo, Maxtec, Novak, Futaba, Associated, Pro-Line, Protoform, Lunsford, Kimbrough and MIP.
Age	24
Hometown	Fresno, CA
Years racing	10
Occupation	Purchasing agent and full-time student
Other interests	Supercross, F1 and all other forms of racing; also enjoys going to school and is always looking for ways to expand his horizons.
Championship	NORRCA Road Course Nats
Class	4WD Sedan Modified

FINAL THOUGHTS

We hope you've enjoyed "going to school" with these winning machines. It takes a lot of talent, time and attention to detail to get to the winners' circle, and it shows in the work of Cliff, Kirby and Brent. They've pushed the technology at their disposal to its limit—and beyond. We hope you'll be inspired to do the same!

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

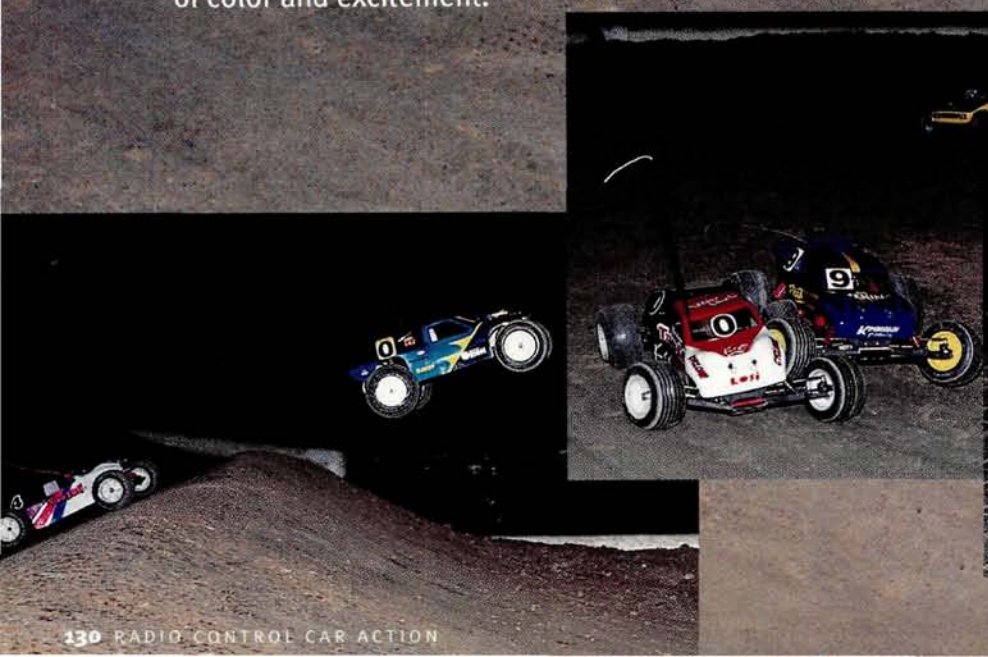
PRO-LINE®

Endless Summer Classic

Hot weather and hot racing spell excitement!

by George M. Gonzalez

Every year on the last day of summer, Pro-Line sponsors the Endless Summer Classic. Although this is not a sanctioned racing event where points are accumulated for future national or world championship titles, drivers from all over the U.S. gather to enjoy a weekend of basking in the California sunshine and racing against the hottest drivers in the country. M n M Hobbies in Corona, CA, hosted the event and, as always, ran a professional racing venue while maintaining the element of fun all weekend long. As in past years (and as the photos suggest), the Pro-Line Endless Summer Classic was full of color and excitement.



UNUSUAL RACING TEAMS

We always love to see those father-and-son racing teams. Nothing seems to bring a father and son closer than when they share a fun and exciting hobby. But R/C racing is not restricted to father-and-son racing teams; why not mother-and-son racing teams? Let's not stop there; how about husband and wife, or boyfriend/girlfriend racing teams?

While cruising around the pits, I met Sherry Brown and her son, Randy, from Temacula, CA; they are regulars at M n M Hobbies. Sherry is Randy's one-woman pit crew. She cleans tires, solders motors and batteries and even turn marshals while Randy does all the racing. She's also Randy's one-woman cheering section. Sherry plans to start racing very soon; then she'll have to get a pit person of her own.

Louis Fernandez was a lonely R/C racer until he raced against Sheri "the Mom" Barr at M n M Hobbies. Sheri smoked Louis in the Main, and the two fell in love shortly thereafter. The couple is now engaged and plans to have an R/C wedding at M n M Hobbies. Just imagine: tabletop jumps and wedding cake ... sounds like the start of a revved-up relationship!

Tim Russell and his wife, Christina, are also regulars at M n M Hobbies. Tim is a talented racer who enjoys competing against other talented drivers. Christina doesn't really race R/C cars, but she is involved in the hobby in another way: she's the official M n M Hobbies trophy girl. Tim plans to teach Christina everything he knows about R/C racing. Here, Tim is shown teaching his wife how to solder. (I'm not sure this is her favorite aspect of the hobby.)

PHOTOS BY GEORGE M. GONZALEZ

PLENTY OF CLASS

The Endless Summer Classic offers racing classes for every skill level. The Sportsman 2WD and Sportsman Truck classes are just what the doctor ordered for those who are just starting out. Each driver in these classes is given Reedy motors and batteries and Pro-Line tires, so the competition is equal and the costs are low. The 2WD, 4WD and Truck Stock classes allow the contestants to use whichever motor, battery and tire combination they prefer, and

WINNERS

SPORTSMAN CAR A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:24.89	Nick Blais	Losi
2	9	4:02.34	Matt Lauerman	Losi
3	9	4:03.73	Jeff Maurer	Losi
4	9	4:06.47	Frank Riley	Losi
5	9	4:10.44	Tim McNamara	Associated
6	9	4:13.10	David Branka	Losi
7	9	4:15.23	Martin Blais	Associated
8	9	4:16.45	Rick Palmer	Losi
9	9	4:27.93	Michael Tarkington	Losi
10	7	3:28.26	Earl Valles	Associated

SPORTSMAN TRUCK A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:24.62	Aaron Westin	Losi
2	10	4:24.69	Jacob McGarvey	Losi
3	9	4:01.67	Mike Bauer	Associated
4	9	4:08.60	Justin Anderson	NA
5	9	4:10.76	Rod DeCastro	Losi
6	9	4:14.70	Jeff Maurer	Losi
7	9	4:17.58	Jeff Gutierrez	Associated
8	9	4:19.12	Earl Valles	Associated
9	9	4:20.13	Paul Self	Losi
10	8	3:55.87	Robert Newby	Losi

STOCK TRUCK A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:24.02	Jason Corl	Associated T3
2	9	4:00.24	Jim Lee	Losi
3	9	4:02.75	Justin Morrison	Losi
4	9	4:04.44	Carson	NA
5	9	4:08.92	Jake Thome	Losi
6	9	4:09.49	Cliff Lashley	Losi
7	9	4:12.43	Will Martin	Losi
8	9	4:13.89	Fred Fleck	Losi
9	9	4:17.20	Ray Velazquez	Losi
10	1	0:22.57	Andy Smolnik	Associated

4WD MODIFIED A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:05.06	Trevor Adamo	Losi
2	10	4:18.62	Dustin Biber	Yokomo
3	10	4:30.71	Brian Adams	Losi
4	9	4:01.93	Matt Lauerman	Losi
5	9	4:04.38	Robert Drew	Losi
6	9	4:07.52	Don Vinkemulder	Schumacher
7	9	4:10.62	Alex Fernandez	Yokomo
8	9	4:25.04	Kent Beal	Losi
9	9	4:38.78	Eric Snellbaker	Losi
10	5	1:54.18	Dave Flores	NA

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vehicle setup is paramount. The 2WD, 4WD and Truck Modified classes are the big draw, and the competition is always fierce in these classes.

QUALIFYING AND MAIN EVENT OVERVIEW

• **2WD Stock.** Charlie Albrecht ended up with the TQ honors after posting an amazing 10/4.24:69 best run. Gene Hickerson was the only other driver in the class to break 10 laps, but he was a couple of seconds shy of the TQ.

2WD MODIFIED A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:02.89	Brian Kinwald	Losi
2	10	4:07.72	Billy Easton	Associated
3	10	4:17.50	Jimmy Jacobson	Associated
4	10	4:23.22	Gabe Boudreau	Losi
5	9	4:02.22	Chad Phillips	Losi
6	9	4:04.71	Mike Walker	Associated
7	9	4:06.82	Dustin Biber	Associated
8	7	2:49.16	Todd Cariseo	Associated
9	6	2:35.95	Travis Amezcua	Associated
10	1	0:30.22	Chad Bradley	NA

4WD STOCK A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:28.66	Danny Boy	NA
2	10	4:31.15	Mike Kuykendall	Losi
3	9	4:00.77	Paul Self	Losi
4	9	4:06.12	Earl Valles	Losi
5	9	4:14.44	Justin Richards	Losi
6	9	4:16.77	Mark Barden	Losi
7	9	4:20.93	Sam Carter	Losi
8	8	4:03.05	Kris Brodowski	Losi
9	8	4:06.14	Robert Arneson	Losi
10	8	4:10.47	Big Mike	Losi

MODIFIED TRUCK A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	11	4:26.01	Brian Kinwald	Losi
2	10	4:07.64	Jimmy Jacobson	Associated
3	10	4:16.43	Chad Bradley	Associated
4	10	4:19.50	Rick Linn	Associated
5	10	4:19.76	Todd Cariseo	Associated
6	10	4:20.94	Austin Dvorak	Associated
7	10	4:22.06	Gene Hickerson	Losi
8	10	4:24.08	Mike Walker	Associated
9	9	4:03.66	Bobby Smith	Associated
10	9	4:06.17	Dustin Biber	Associated

2WD STOCK A-MAIN

Pos.	Laps	Time	Driver	Vehicle
1	10	4:13.53	Gene Hickerson	Losi
2	10	4:17.40	Andy Smolnik	Associated
3	10	4:21.32	Mark Liening	Losi
4	10	4:23.61	Rick Linn	Associated
5	9	4:00.53	David Mangelsdorf	Associated
6	9	4:02.70	Jason Corl	Associated
7	9	4:03.67	Nick Blais	Losi
8	9	4:07.93	Jay Neill	NA
9	9	4:11.85	Charlie Albrecht	Losi
10	3	1:23.99	Brian Wright	Associated

AND YOU'VE GOT THE KEYS.

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EXCITEMENT IN THE FAST LANE

Hickerson turned it on in the A-Main by posting a super-fast 10/4.13:53 to take the win and the first-place trophy. Albrecht ran into trouble during the Main and ended in ninth place. Andy Smolnik and Mark Liening took second and third, respectively.

• **Stock Truck.** Jason Corl's Associated T3 was on fire, and he was the only driver to post a 10-lap run. Corl repeated his performance in the Main to take home the championship. Jim Lee, Justin Morrison and Jake Thome also raced very competitively and took home second- and third-place trophies.

• **4WD Stock.** A racer who goes by the name "Danny Boy" qualified tenth, but finished first in the Main to take the win. Top qualifier Justin Richards couldn't find the right line during the Mains and finished fifth. Mike Kuykendall finished second, while Paul Self rounded out third.

Serious bench racing.

Team Associated team driver Todd Cariseo happily works on his B3.

• **Sportsman Car.** All the racers in this class were using the same motor, batteries and tires, so the competition was fierce. Matt Lauerman ended up taking the TQ, but it didn't come easily; Nick Blais and Frank Riley were constantly nipping at his heels. In the Main, Blais put in a brilliant run and ended up posting a 10/4.24:89 to take the win (that's just as fast as the 2WD stock guys!). Lauerman ended up taking second, while Jeff Maurer came out of nowhere to take third.

• **Sportsman Truck.** Mike Bauer took the TQ honors, but Justin Anderson and Aaron Westin gave him a run for his money. Westin took the win in the Main after a photo-finish decision. Jacob McGarvey crossed a millisecond later to claim second. Bauer finished third (a lap down from the leaders).

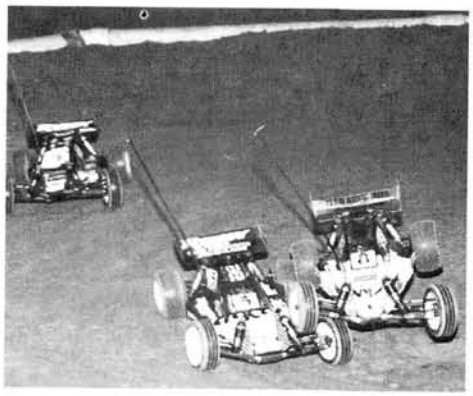
Kinwald takes a snooze between heats.

Louis Fernandez (left), Alex Fernandez (right) and Sheri "the Mom" Barr argue over who's the fastest in the family.

• **2WD Modified.** Team Trinity/Team Losi factory driver Brian Kinwald took the TQ honors and was 5 seconds faster than his nearest competitor. Team Associated factory drivers Billy Easton and Jimmy Jacobson were on the prowl, though. During the Main, Kinwald found the right line and stayed in front throughout the race. Brian finished 5 seconds faster than his nearest competitor, Easton, to take the win. (Don't you just love consistency?)

• **Modified Truck.** Kinwald smoked the competition in this class, too. He was more than 16 seconds ahead of the rest of the field to take the TQ honors, and he nearly set the track on fire during the Main, when he posted an almost impossible 11-lap run! Jimmy Jacobson finished in second place, while Chad Bradley ended quite contentedly in third.

• **4WD Modified.** Trevor Adamo managed to take the TQ honors after fighting tooth and nail with Alex Fernandez and Dustin Biber. He had a little easier time in the Main and won it effortlessly. Dustin Biber and Brian Adams took second and third, respectively.



FINAL THOUGHTS

If you're ever in Southern California at the end of summer, we highly recommend that you attend this event. Better yet, send in your entry and compete in one of the classes. Who knows? Maybe your smiling face will appear in *R/C Car Action* magazine, as well. ■

HOW TO

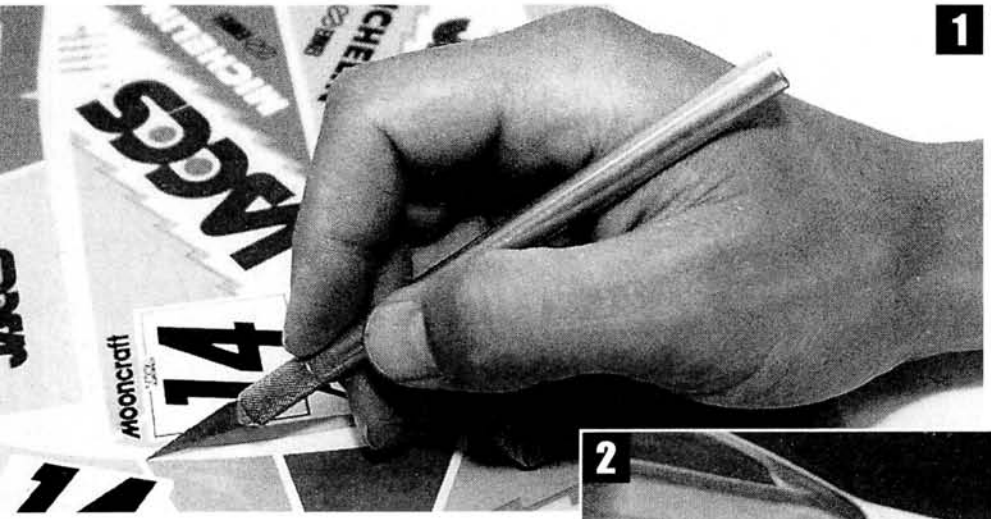
Apply Decals

8 Steps for slicker stickers

by Kevin Meyer

You'll Need:

- High-quality body and decal set.
- Hobby knife with extra blades, or a sharp scissors.
- Decal-application solution.
- Hair dryer.
- Paper towels.



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▶ *Cut as close to the colored graphics as you can. This will give a more realistic appearance and make the stickers easier to apply.*

When applying application fluid, just "mist" the decal and the area where the decal will be placed. This will help you get the correct location before the adhesive sticks to the body. Don't get carried away with the application spray—you don't need to "flood" the area. This will just take longer to dry and cause more fluid bubbles.

▼

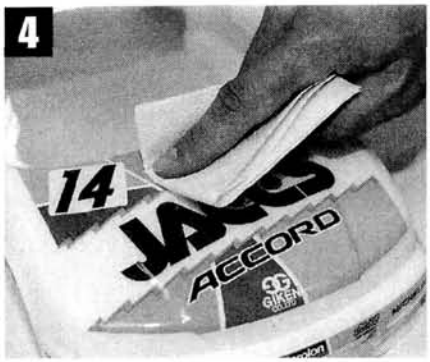
WITH THE outstanding decal packages available to R/C modelers today, many seemingly intricate paint schemes can be duplicated with a simple one- or two-color paint job and the appropriate decal set. In many instances, the modeler can complete an entire graphics job in one or two evenings and obtain stunning results. In this "How to," I'll show you how to lay down decals like a pro!

Transport the sticker on the end of your hobby knife or hold it lightly by the edges. Try to avoid touching the adhesive backing.

This project requires no special talents. Just remember the three "P's" of decal application: patience, patience, and patience.

In the end, the benefits are many. Your results should garner tons of positive comments from your R/C buddies. You'll get a real sense of achievement. Plus, the awesome-looking body you'll have when you're finished should increase your driving skills, too—probably because you'll be afraid to crash that new body into the wall!

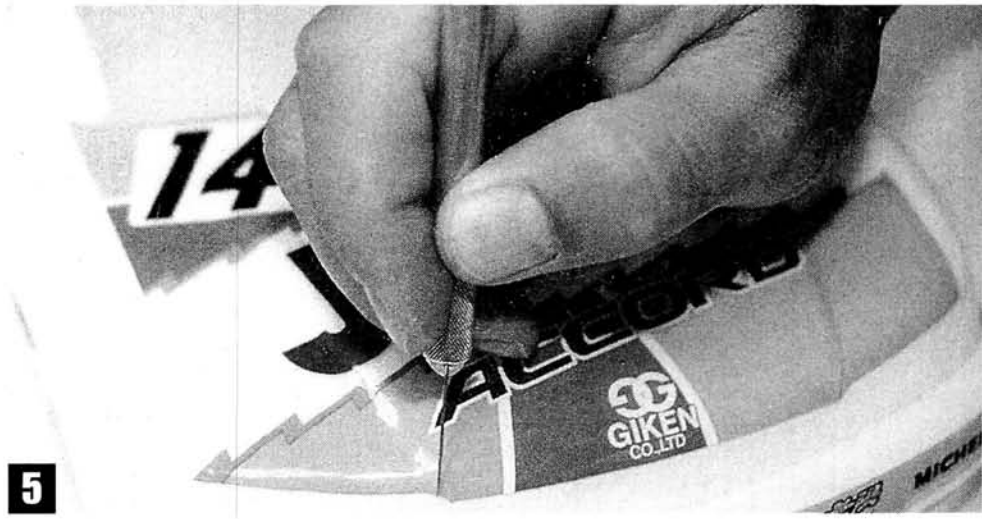
PHOTOS BY KEVIN MEYER



When you have the decal where you want it, give the adhesive a few minutes to dry, then use a paper towel to squeegee out excess fluid and air bubbles. Stubborn bubbles can be pierced with a hobby knife and smoothed out with the paper towel.

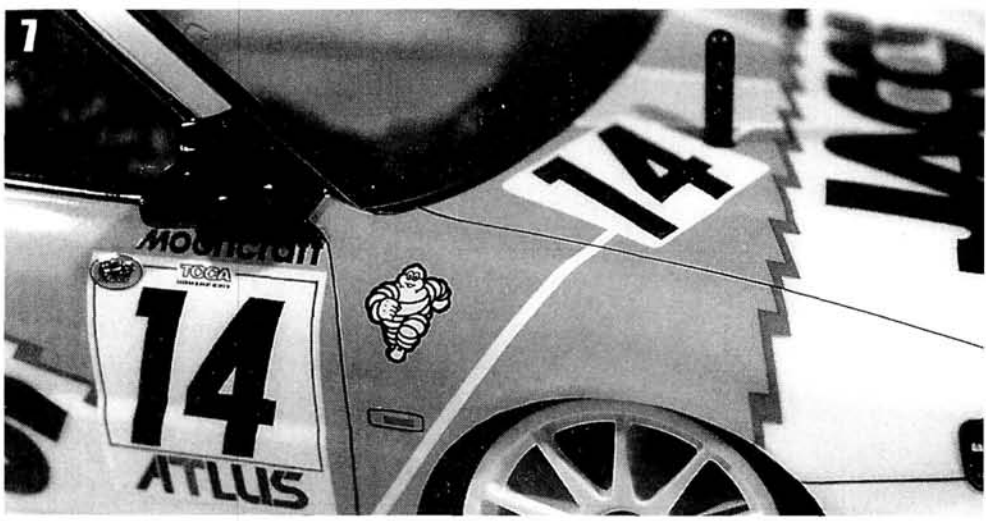
Tips to remember

- Start your projects with a clean work area, good lighting and a good attitude.
- Before starting the project, be sure your hands are clean. Oil and dirt from your hands can be transferred to the adhesive backing and reduce its effectiveness.
- Use a name-brand decal-application solution such as Autographics'* Sticker-On instead of a homemade mixture; this will ensure fast drying and will eliminate the likelihood of decal clouding. This will also give better adhesive strength, as some homemade recipes will attack and wash off the decal's adhesive.
- The use of decal-application solution may make it harder to get the sticker to conform to certain curves. Apply the fluid sparingly, and use a hair dryer to make the sticker more pliable. Never use a heat gun; it might distort the decals and make the paint bubble, and could even melt the body.
- Allow adequate time for areas to dry to before you continue with the next section. By doing so, you'll avoid messing up or moving any previously applied stickers.
- Work on small sections at a time. This will help ensure that decal placement on both sides of the vehicle is identical.
- Take frequent breaks and examine your work. This is very important! You'll avoid becoming fatigued, and as you admire your efforts, your confidence will increase.



Still have some persistent wrinkles that won't go away? You can help smooth them out by making a small relief cut on the problem area.

A blast from a hair dryer on medium setting will make the decal more pliable, and it will conform more easily to all those tricky concave surfaces. While you apply the heat, "train" the sticker with your fingers as you go. You may need to use the high heat setting. When using the hair dryer, take care not to heat any previously applied graphics.



Finish with some fine detailing tricks. The decal seams can be concealed with a thin piece of pinstriping. Do the same trim work around hood, trunk lid and doors.

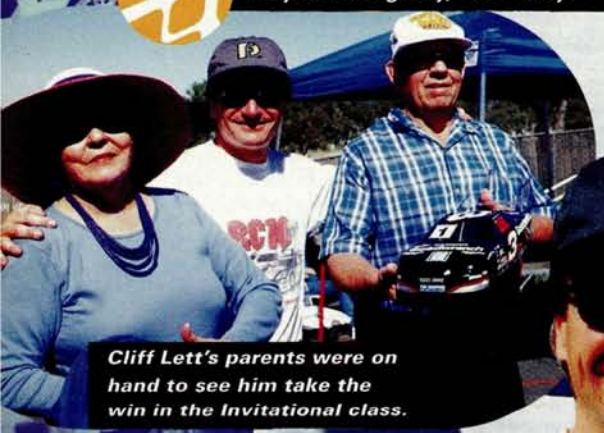
Use a Q-Tip to burnish down those small confined spots. This will also help squeegee out any leftover fluid. ■

This is it—the massive Dominguez Hills Olympic Velodrome. This nearly quarter-mile monster quickly separates the racers from the posers.

NORRCA WINTER

by Mike Ogle

The invitational A-Main lineup. They all look guilty, don't they?



Cliff Lett's parents were on hand to see him take the win in the Invitational class.

Winterfest? With weather in the mid-80s and the fastest oval racers in the world scorching the giant Dominguez Hills Olympic Velodrome at escape-velocity speeds, there was nary a chill to be felt; in fact, the 1997 NORRCA Winterfest could go into the record books as the most sizzling-hot mega-oval race ever held!

This annual, late-season bike-track event always draws out the baddest oval guns from all over the country; 1997 was no exception, as racers flying the colors of Peak, Maxtec, Reedy, Twister, Kisbey, Fantom and several other motor manufacturers showed up to battle it out on the big oval. If you've got the ponies, this is the track that will let you hang 'em all out there. With 1,300-plus feet of steeply banked track to cover, very few racers click off the "Big Left" more than 20 times in the allotted 4 minutes.

Cliff displays the severed diff assembly of his Speed Run car. The diff hub parted company with the axle after a spectacular bit of aerial acrobatics.

Cliff's "insane" car—lotsa batteries, lotsa speed!

EST

big track, big speeds, no snowballs in sight!

INVITATIONAL CLASS A-MAIN

Do the math, and you'll see that Cliff Lett, Erik Steenhoven, Roger Pane, Derek Povah and Gary Hamilton were absolutely flying with their record-breaking 21-lap, 60mph-plus performances. Cliff's black, Earnhardt-inspired, Reedy-powered 10L2O started from the pole position but was passed before the second turn by several drivers, including teammate Roger Pane. Lett spent 3 minutes and 30 seconds studying Pane's taillights before eventually pulling around him on the high side and showing the way to Superior/Kisbey's Erik Steenhoven, who also squeaked by Pane for second place. Derek Povah's Maxtec-powered 10L2O's 21-lap, 4:13 performance got him a fourth, and 1 second later, Associated's Gary Hamilton closed out the 21s at 21:04.14 for a strong fifth-place finish.

The tech table was a very busy place at times. Frank Killam, Tom Bowlin and Mark Pavidis line up to number their cars.

PHOTOS BY MIKE OGLE

Expert Modified A-Main

Pos.	Laps/Tme	Driver	Chassis	Motor	Speed control	Batteries	Tires
1	20/4:00.49	Joe Blackburn	Associated	Pipp	Tekin	Orion	Jaco
2	20/4:01.02	Tom Gerow	Pope	EastCoast	Novak	World Class	BSR
3	20/4:04.62	Mark Mitchell	Superior	Fantom	•	Xipp	Jaco
4	20/4:05.33	Paul Cathey	HPI	Kisbey	Tekin	Mac Attack	Jaco
5	19/4:00.40	Greg Larson	•	Maxtec	•	•	•
NASTRUCK A-Main							
1	18/4:04.23	Larry Pipp	HPI	Fantom	•	•	•
2	17/3:52.18	Lee Patton	Scratch	Yokomo	Tekin	World Class	BSR
3	17/4:00.80	Robert Setterquist	HPI	Fantom	Tekin	Pro-Match	BSR
4	17/4:03.09	Joe Myers	HPI	Fantom	•	ESP	BSR
5	17/4:07.31	Travis Costello	Trinity	•	•	Ballistic	Jaco
Invitational A-Main							
1	21/4:07.06	Cliff Lett	Associated	Reedy	LRP V6	Reedy	Jaco
2	21/4:08.97	Erik Steenhoven	Superior	Kisbey	Novak	ESP	Jaco
3	21/4:09.77	Roger Pane	Associated	Reedy	LRP	Reedy	Jaco
4	21/4:13.79	Derek Povah	Associated	Maxtec	Tekin	Maxtec	Jaco
5	21/4:14.92	Gary Hamilton	Associated	Reedy	Novak	Orion	BSR

EXPERT MODIFIED CLASS A-MAIN

This class was also flying; times rivaled those of the factory pilots. Joe Blackburn was the class of the independents, and his 20-lap, 4:00.49 run took the win. Note the decimal places; I'm sure Joe will return to the Big Oval this year with "phasers on kill" to claim that blasted last half second! Tom Gerow's EastCoast-powered Pope Chassis racer turned in a 20-lap, 4:01 for a close second, while Mark Mitchell's Fantom-powered Superior "Spectre" and Paul Cathey's Kisbey/HPI also landed in the 20-lap club with their third- and fourth-place finishes.

NASTRUCK A-MAIN

Even the NASTRUCKS knocked on the 20-lap barrier. TQ Larry Pipp's HPI/Fantom ran 18 in 4:04 for the big win. Lee Patton, Robert Setterquist, Joe Myers and Travis Costello from Gilbert, AZ, all followed with strong, 17-lap performances, making this one of the fastest—if not *the* fastest—truck races ever!

ENDURO

In the Enduro "Super Speedway" class, in just about 30 minutes of lightning-fast laps with blink-and-you'll-miss-it pit stops for fresh batteries, Bill McAneney got to the 150-lap mark first. Eric Larsen's Trinity-powered, First-Place RC Chassis actually came in second place with 126 laps, and Derek Povah's Associated/Maxtec racer and Mark Frost's Peak-powered 10L followed in third and fourth, respectively.

UNLIMITED SPEED RUN

The Winterfest is also the event in which the Unlimited Speed Run cars take the spotlight. Several new benchmarks were set at this year's competition, including the "Yeager" Award for an R/C car's longest, highest flight; the "Most complete disintegration" award and last, but not least, the new World Record Oval top speed—over 94mph by Cliff Lett's highly modified, Aveox-powered Associated 10L2O.

Gary Hamilton—a past speed run record-holder—laid down the gauntlet early with an 87mph run, and Danny Egger's car clicked off a couple of fast laps. But the crowd came to life when

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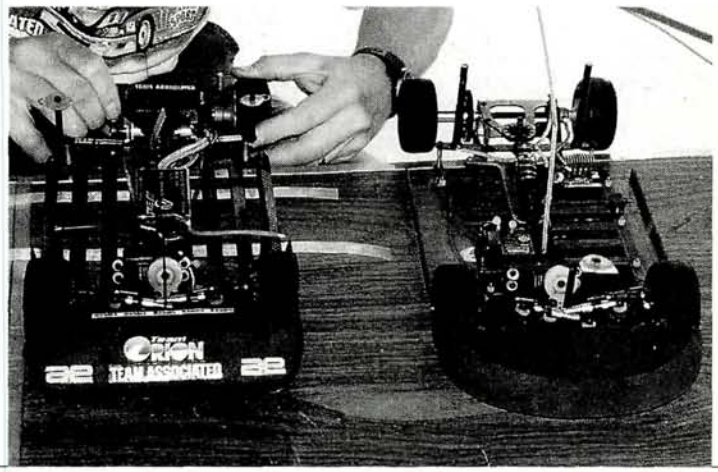
Bruce Chong's Unlimited Speed Run car took top honors in the "most complete disintegration" category after running into a wall at more than 70mph. Pretty nasty!

Bruce Chong's NASCAR-bodied speed-run car punched a hole in the wooden retaining wall at the top of turn three and disintegrated in the process. Then came Cliff Lett.

Cliff's run was a spectacle of precision driving, near disaster and ultimate triumph. His Associated/Aveox 10L2O laid down a blistering 8.3-second, 94.22mph lap, but not without incident. As Cliff's car approached 100mph on the front straight, enough air snuck under the chassis to lift the car off the ground and point its nose past vertical skyward. In that instant, it appeared the car would backflip onto its roof, but luck prevailed, and the machine slapped back down onto the track on all four wheels. The car stayed together for another three quarters of a lap but eventually jettisoned its rear axle, which had no doubt been fractured by the force of re-entry. The crowd loved it. It was history—and definitely worth the price of admission (had they charged admission) to see the fastest oval racer in the world nudge ever closer to the triple-digit mark.

But for crowd-pleasin' performances, you just couldn't top what happened next. On his second attempt at a Speed Run record, Bob Utley stole the show by smacking the small pit entrance wall at full speed, launching his car about 45 feet into the air. The car stayed airborne just about all the way to the end of the front straight! This was doubtless some sort of world record in itself, if anyone is keeping track of such gruesome statistics. And the crowd went wild!

If you can only get to one oval race a year, make it the NORRCA Winterfest. For the racer (or spectator) who equates good racing with ballistic speeds and banked turns, the Winterfest doesn't disappoint. So come on down, but leave your snow suit at home. Winter doesn't get any hotter! ■



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BY DOUG MERTES

TCS Race

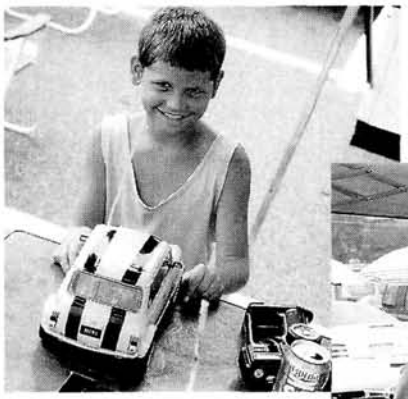
Chopper 5 reports a bit of congestion at the TCS race. All race participants gathered with their cars for this group shot, then they dispersed for a fun-filled day of friendly competition.

Once again, the Tamiya Championship Series (TCS) caravan pulled in to Laurel, MD, for the 39th TCS race. Now in its third year at this location, this has proven to be one of the best attended events on the calendar. More than 100 racers braved the heat and humidity to enjoy a super day of friendly racing hosted by Mike Brey and the fine folks at Hobby Works. It is not unusual for racers to drive from as far as Canada, Massachusetts, New York and New Jersey to attend this event, and it's easy to understand why: Tamiya and Hobby Works put on one heck of a show!

Here's how the racers finished up after the dust had settled. Seiji Ito, a Japanese native currently residing in New York, took the Formula 1 honors with a beautifully set up Ferrari, while local favorite Sanford Bradby came from behind to snatch second place overall with his venerable 102 Series chassis. Jones Kim once again came down from New Jersey to wallop the Maryland racers in Front-Wheel-Drive Sedan, but this year, Casey Young was ready for him. The two duked it out in all three heats, and Kim once again walked away the winner. The Mini class was hotly contested, and nobody was really sure who had won until the last race of the day had been run. Overall, Adam Mouradian took first-place honors, and yours truly finished second.

The killer races of the day, however, were in the Modified Sedan 4WD class. Easily the largest group of racers, from the opening tone these guys gave notice that they were out for blood! Earlier in the day, I stood next to Bryan Hostetter on the drivers' stand as we put in a few practice laps. Usually very quiet about his setup and reticent about his car's performance, he had only four words to say: "This car is dialed!" Sure enough, Bryan's car ran away from the field with times that were a full lap or more ahead of his closest competition. Gabriel Grigonis took second.

TCS isn't all about winning, however; every participating driver received a door prize, made new friends and got to spend the day bench racing. If the Tamiya Championship Series comes anywhere near your home, you owe it to yourself to get out there on the parking lot and get involved!



The license plate says "mini," and Christopher Shumate was one of the youngest drivers there. Coincidence? I think not! Whatever the age, fun was had by all at the 39th TCS race and, more importantly, it lit the R/C fire in a bunch of new racing hopefuls.

Nothing but smiles here. This group from Brownies Hobbies in New York was one of the largest contingents at the race. Look at all the equipment in their pits; I'd hate to be one of the guys on the cleanup committee.

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Whether you're a dealer or just a bunch of fun-lovers in search of a race program, call now! Here are a few hotline numbers to call if you have any questions, or if you'd like to start a program in your area.

Bolink Legend Series
(404) 963-0252

Tamiya R/C Championship Series
(800) TAMIYA-A

Kyosho R/C Sport Racing
(800) 682-8948
ext. 085F

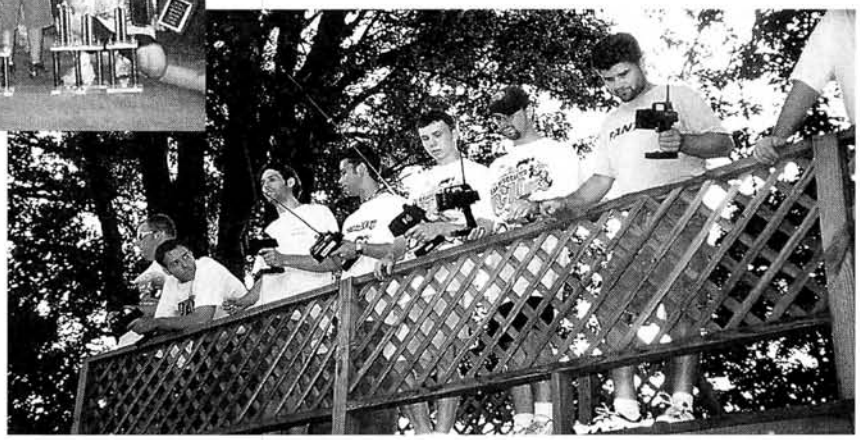
Hobby Shack Parking Lot
(714) 964-8846

Hobby Town USA Parking Lot
(402) 434-5050

Trinity Street Spec Series
(908) 862-1705

The 9th Annual Indiana State Off-Road Championships

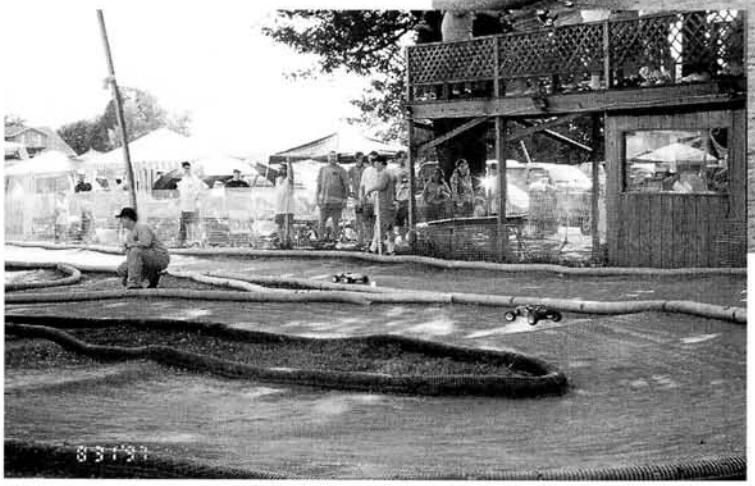
Night was falling as the races finished, but darkness wasn't going to stop the participants from receiving their trophies. With all that hardware being handed out, the racers would probably have stayed until the next day for the presentation!



Intimidation didn't seem to be a factor here. The A-main drivers gathered on the stand and leisurely waited for the ready signal. When they got down to it, the intense race was enjoyed by all spectators.

Last year marked the ninth running of the Indiana State Championships. The event proved once again that R/C racing is in full swing in Indiana, as over 200 eager applicants filled out entry forms. R/C World, the venue for the championships, pulled out all the stops to provide the best race possible for the participants. They held a warmup race the previous week to help get everyone into the groove; the fee for the state race included the warmup. Racers were allowed to use their own stock motors after they had been teched by the race director. Racers also had an excellent time with the big guns in the modified class, and they enjoyed the return of the 4WD class.

Although a brief computer glitch held up the start of the action, the Indiana State Champs officials quickly corrected the problem and put on a great weekend of racing. In addition to the entertainment of R/C car racing, a DJ supplied some tunes, and a big ole hog roast was held on Saturday night. What race would be complete without one?



PHOTOS BY DOUG MERTES

Above: the large, well-groomed track was challenging to drive, yet left plenty of passing room to keep the racing close. However, it looks as though someone didn't want to give up his line from the start. Left: a large drivers' stand, smooth track, plenty of pit space and a retaining fence for overzealous onlookers; this race venue has it all!

HOW TO Build a Saddle Pack

Side-by-Side Soldering Simplified

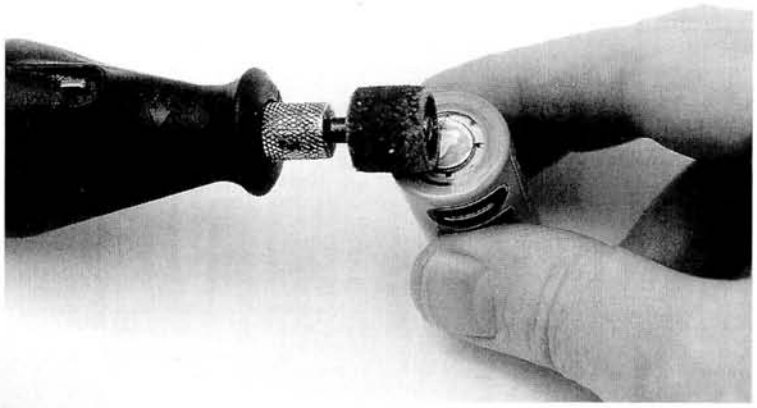
by Doug Mertes

FOR THE LAST five or six years, the stick-pack battery has dominated our hobby. Although some of us have been putting matched cells together, side by side, LTO-style to fit oval and off-road cars and trucks, the vast majority of R/C'ers use the tried-and-true pre-assembled stick pack. Now, however, we are seeing a resurgence of chassis designs that require saddle-pack batteries; most pan cars, many sedans and even some off-roaders, like the zooty new Team Losi XX4, use saddle packs.

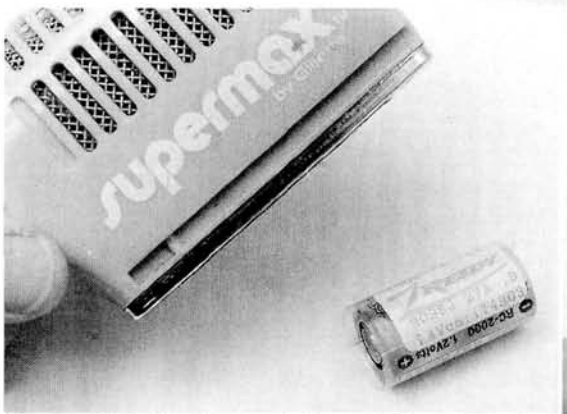
The saddle-pack configuration has two sets of three cells joined by an insulated wire. In the case of the XX4, this design is used to accommodate the belt housing in the center of the car; other vehicles use saddle packs for greater flexibility in distributing the weight of the cells. Assembling your own saddle packs isn't difficult, but there are some steps you can take to make it easier and ensure optimum battery performance. Here's how!

PREPARATION

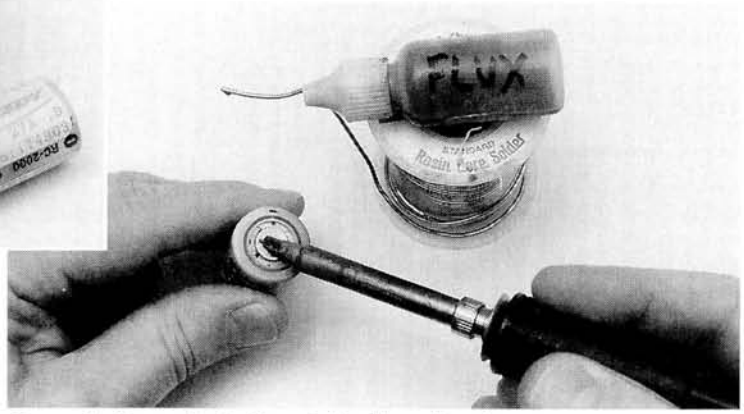
Prepare the cells for assembly by lightly sanding each contact with a sanding drum, run at low speed, on a Dremel tool. You can also use a metal file or a piece of sandpaper, but you're more likely to scar and tear the cell's insulation by doing that. The Dremel is easy to control, and it takes only a few seconds on each end to do the job right. Next, put an additional layer of clear shrink-wrap on the cells for extra protection against short circuits that can be caused by chassis plates or rough edges. If you have matched cells, this step will also protect the delicate paper matching labels. Most hobby shops sell shrink-wrap of the size you need by the foot, or you can purchase a package of precut pieces. Place a piece of shrink-wrap on each cell, and use a heat gun or a hair dryer to shrink it tightly.



Lightly sand both ends of the cell; the solder will adhere much more effectively.

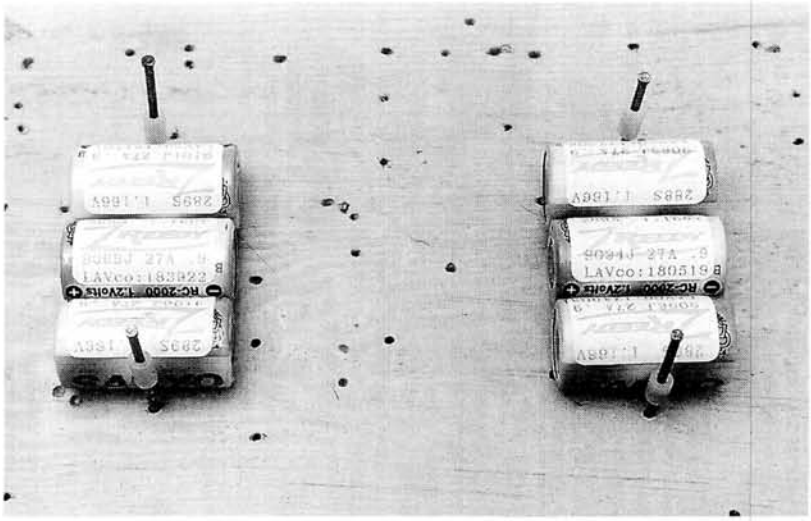


You can find shrink-wrap that's made to fit individual cells at most big hobby shops. A hair dryer does a good job of making them fit tightly.



Use rosin flux and a hot iron to tin the cell ends.

PHOTOS BY DOUG MERTES



Use a flat board (this is 1x6-inch pine) and some finishing nails to hold the cells in the proper configuration while you glue them together. Alternate the contact ends so that you can easily connect them in series.

CONFIGURATION

Next, lay out the cells in the proper configuration on a piece of flat pine (or other softwood) board. Remember that each cell must be positioned so that their positive and negative contacts can easily be joined with a battery bar. Hammer a no. 16 finishing nail into the board at either end of each group to hold them in place, and lock the cells down using a short piece of fuel tubing that slides over the nail. Run a bead of Shoe-Goo, Marine Goop or a similar RTV silicone between each set of cells, and use your index finger to smoosh it into the crevices. I prefer a "soft" adhesive like RTV rather than CA or epoxy because it allows the cells to be pulled apart more easily when you want to repair or rematch your packs. Let the cells set and dry overnight, then flip each group over and repeat the process on the other side. After the second side has dried overnight, you are ready to solder the cells together.

SOLDERAMA!

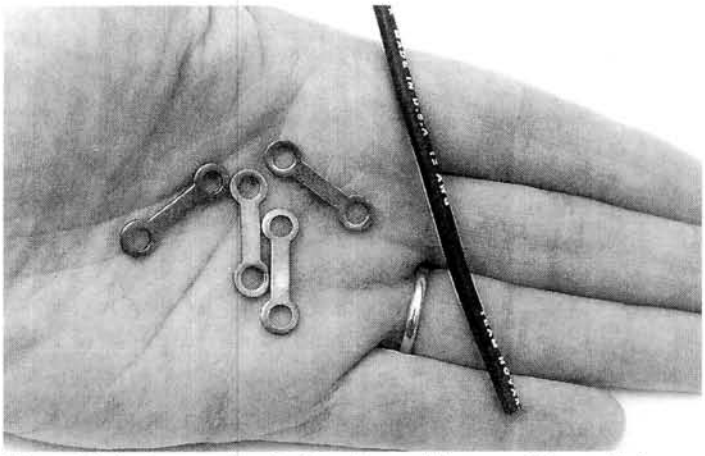
Now it's time to tin the cell contacts; "tinning" puts a coating of solder on the cells so that it will be easier to solder the battery bars in place. Put a small drop of rosin flux (Trinity* makes a great flux that comes in a small plastic bottle) on each contact, then melt a half inch or so of solder onto the end of a good, hot iron. Put the solder on the end of the cell; it should flow evenly across the width of the contact where you sanded off the plating. Try to do this quickly; you don't want to heat up your cells.

When you've tinned each end of every cell, you can install the battery bars. To do this, tin each end (flux isn't usually required), and use the bar to bridge across a pair of cells. Then, while holding the bar down with a small screwdriver, place the soldering iron momentarily on each end of it to solder it to the cell. If you do it properly, very little damaging heat will be transferred to the body of the cell itself.

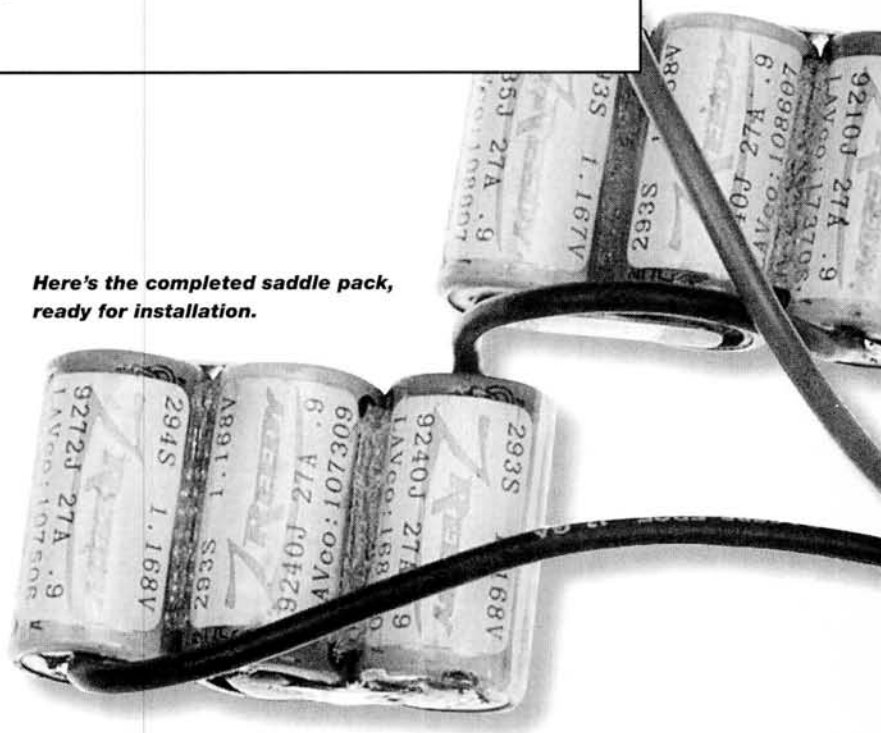
Next, add the jumper wire between the two groups of cells. I recommend using 12-gauge power wire for its low resistance. Place the batteries in the car and cut the jumper wire to a length where it has some slack but doesn't interfere with any moving components; as you did with the battery bars, tin the ends of the wire before you solder. Finally, wire up the plug of your choice by soldering the plug wires directly to the positive and negative contacts.

That's all there is to it! Make sure you store your completed saddle packs carefully so that the contacts don't touch one another and short out; a compartmented nylon fishing-tackle box works very well as a storage container. Happy racing!

**Addresses are listed alphabetically in the Index of Manufacturers on page 217*



These Trinity Lennon Lug battery bars will connect the cells in series, and the jumper wire provides a voltage path between the two groups of cells.



Here's the completed saddle pack, ready for installation.

Project

Tamiya TA03

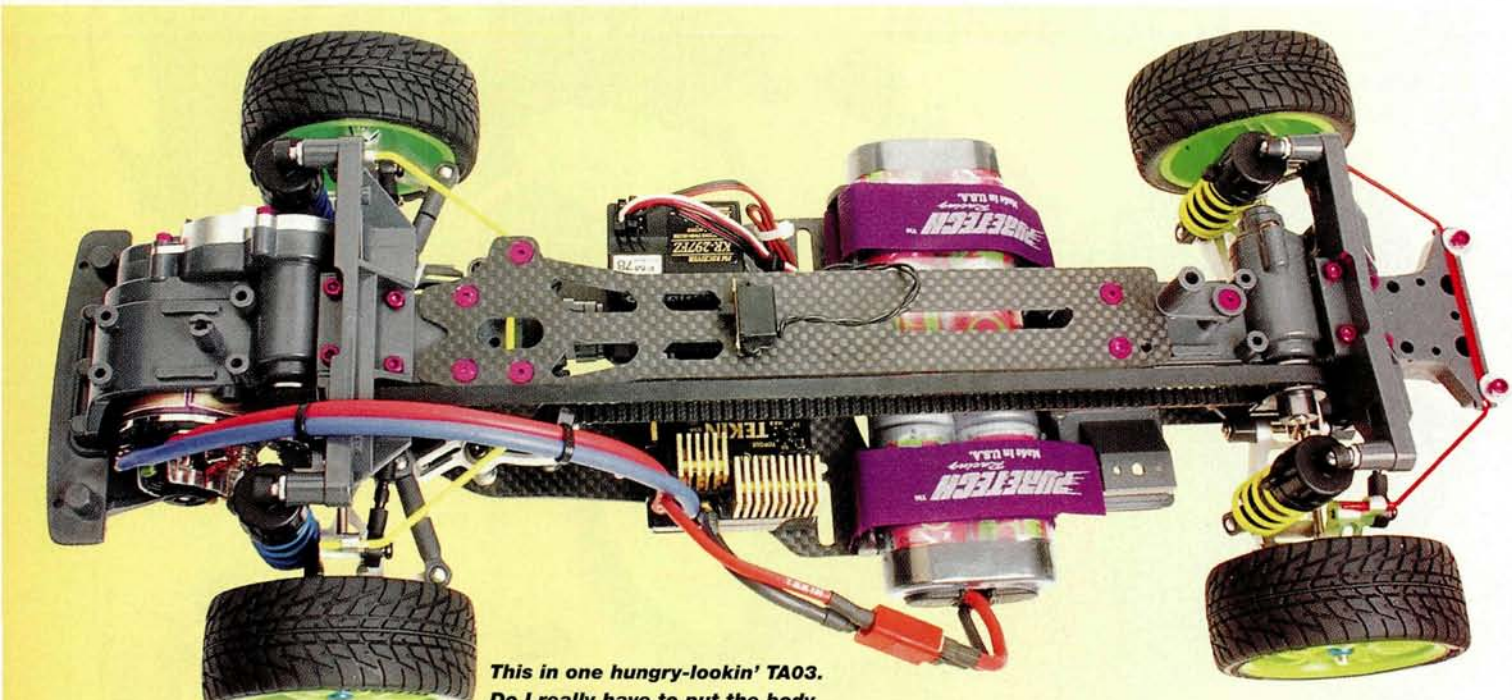
PART 2 FULL OPTION CROSS

by Peter Vieira

A Kure Nismo TA03F was the basis for my Cross project car; the Nissan Skyline is probably my favorite Tamiya body.

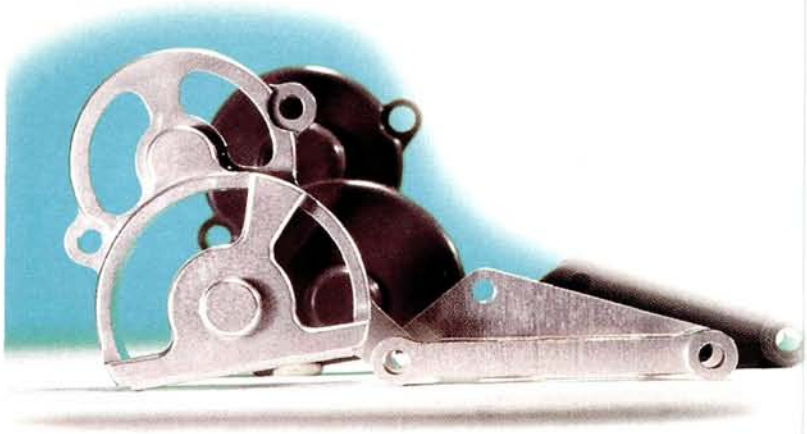
CERTAIN MATERIALS just ooze performance. It might be the light-catching weave of carbon fiber, the subtle luster of titanium, or the bright shine of stainless steel. In this case, it's the glow of machined aluminum, faceted and glistening, that transforms a staid TA03 into a provocative showpiece of craftsmanship and high technology. For this second installment of the three-part Project TA03 series, I've installed a heaping helping of Cross* hop-up parts on the popular Tamiya* chassis. Is the car lighter? Stronger? Faster? Piece by piece, we'll see what these trick bits can—and can't—do for your TA03.

If you want to see prettier pieces of metal, you'll have to look in a jewelry store.



This in one hungry-lookin' TA03. Do I really have to put the body on? This thing is too cool to cover.

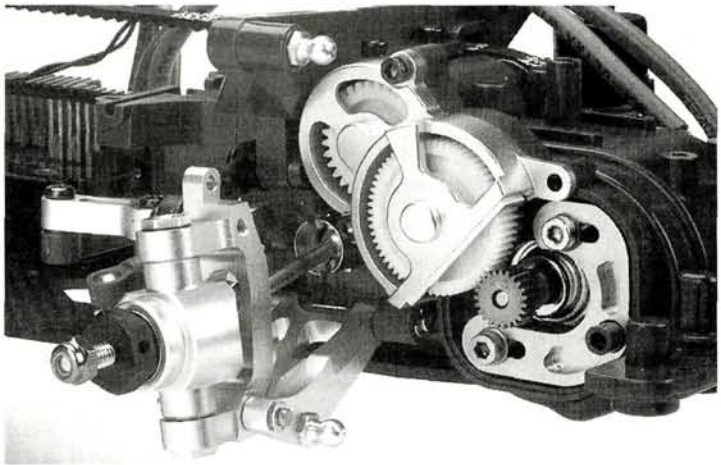
PHOTOS BY WALTER SIDAS



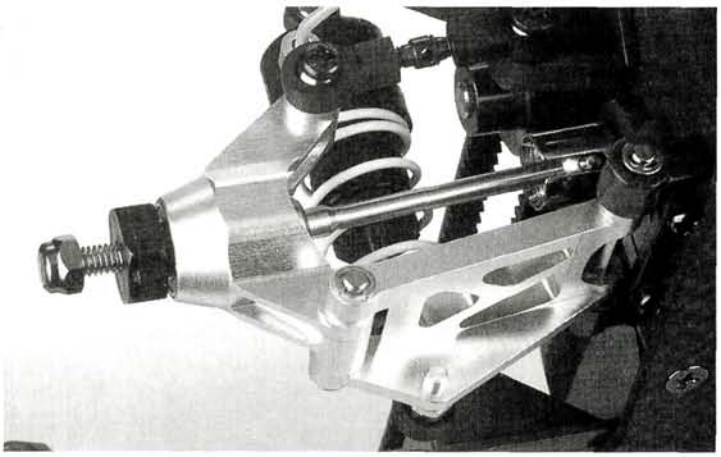
The Cross aluminum upgrade pieces precisely duplicate the dimensions of the stock parts.

STRONG-ARM TACTICS

I added Cross's aluminum suspension arms to all four corners of the "Part 2" machine, but not for the usual rationale of increasing rigidity. The TA03's "Delta-box" suspension arms are already stiff by virtue of their short, non-swept design and deep reinforcing ribs. Instead, it's the exceptional precision of the Cross parts



How cool is this? The cutaway look screams high tech, although the potential for gearbox contamination is high. A Lexan cover would be a trick addition. The motor plate provides more heat-dissipating material than stock and lends support to the motor-mounting bosses.



This rear view shows the slab-sided construction of the suspension arms. Note the large fin that is used to maintain the Tamiya "Delta-box" geometry. The machine work is very precise on all the Cross parts.

TALE OF THE SCALE

Anytime I see milled-out aluminum components, I wonder how their weights compare with those of the parts they're replacing. Before assembling my Cross-mobile, I "weighed the options" to satisfy my curiosity. The results may surprise you; they surprised me!

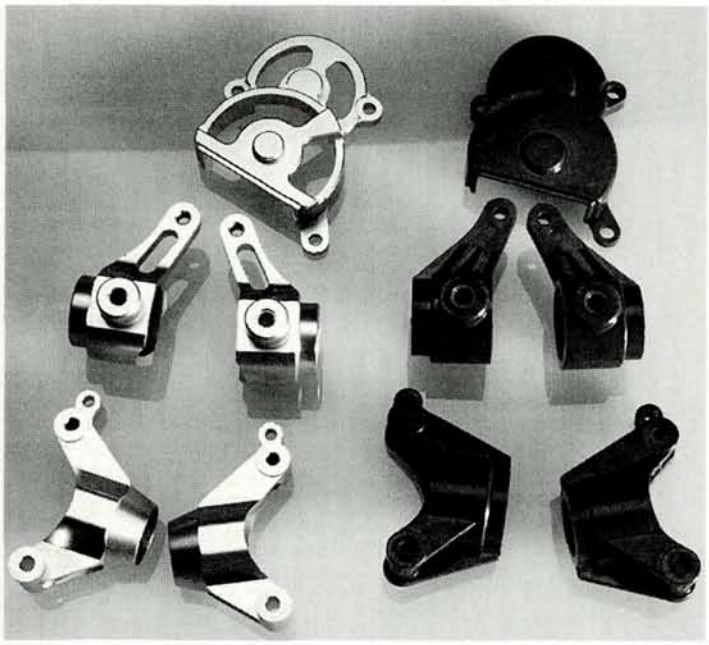
	Cross replacements (each)	Stock parts
ALUMINUM PARTS	**Grams**	**Grams**
■ Suspension arms—part no. TT-16	13	10
■ Front knuckles —TT-35	13	8
■ Front hub carriers—TT-39	13	7
■ Steering-arm posts—TT-18	8	11
■ Steering arm set—TT-37	6	4
■ Rear hubs—TT-42	13	8
■ Heat-sink gear cover—TT-20	6	4
■ Kingpins, long (4pcs.)—TR-18L	2	8
■ Countershaft—TT-07	5	13
■ Pulley—TT-55	4	3
■ Ball set (14)—TT-12	6	14
CARBON-FIBER PARTS		
■ Upper/lower deck—TT-08/50	72	100*
ADDITIONAL PARTS		
■ Pair universal shafts—TT-11		
■ Turnbuckle upper arm set—TT-21		
■ One-way countershaft—TT-06		
■ Aluminum heat sink/motor plate—TT-120		
TOTAL WEIGHT	161	190

*Tub chassis (Tamiya FRP—142 grams with battery holder, 102 grams without holder).

Interesting! Although some of the Cross parts are substantially heavier than their Tamiya counterparts, the Cross car still comes out ahead by a full ounce. If you replace the Tamiya FRP chassis and battery holder with the Cross unit alone, you'll enjoy an additional weight reduction of 42 grams, bringing the total weight saved up to 72 grams (2.5 ounces). For comparison, a pair of standard-width tires and rims weigh in at 63 grams. That difference can certainly help lower your lap times!

If trimming weight is your only goal, you can cherry-pick the lightest Cross parts and leave the lighter Tamiya parts in place; if you add only the Cross aluminum ball ends, steering-arm posts, kingpins, front and rear countershafts and carbon chassis, the total weight savings would be 124 grams (4.4 ounces)—the same weight as a full set of standard-width rims and tires!

that benefits the car; there isn't a hint of rocking on the hinge pins, and the hard-wearing aluminum should be slow to develop any play.



The Cross hop-up parts (left) do not alter the stock TA03 geometry. The Cross goodies shown here total 32 grams, while the Tamiya parts tip the scales at 20 grams.

The Cross parts retain the original arms' geometry and should maintain the fine handling of the TA03 platform. Likewise, the Cross hubs and hub carriers duplicate the original's specs but add computer-milled precision to the front of the car. The front hubs pivot on aluminum kingpins that are one quarter the weight of the steel stockers; plastic bushings prevent the galling that would occur if the aluminum hub carriers and kingpins were allowed to wear against one another.

Finally, a set of rugged machined bellcranks are supported by turned-aluminum standoffs; this eliminates the stock plastic bulkhead for a weight saving of 5 grams. One caveat about the Cross bellcranks: they bind with the stock plastic bushings in place. I replaced the bushings with bearings to correct the problem.

Who doesn't like the high-tech look of carbon fiber? Note the four battery-strap slots that allow fore and aft battery adjustment.

"I would like to thank Mike Reedy for giving me...

...THE FASTEST MOTORS

Masami's Top Qualifying RC10B3

Masami Hirosaka and Reedy Modifieds:
•Top Qualifier, 2WD •Top Qualifier, 4WD
and IFMAR '97 4WD World Champion

RC10

1997 IFMAR WORLDS

HIROSAKA

YOKOMO

REEDY Modifieds

REEDY Modifieds 18

Everybody Else COMBINED: 9

KNOW THE REAL SCORE...
Reedy Modifieds have powered 18 World Champions...
More than all the other motor manufacturers combined!

TRANSMISSION MISSION

One of the most popular tuning options for sedans is the installation of a front one-way unit, and Cross offers an excellent assembly for the TA03 series.

The one-way unit increases on-power steering capability, but at the expense of four-wheel braking; the front wheels freewheel when you jump on the binders. The Cross unit includes a hardened-steel shaft, a one-way bearing and an aluminum thrust washer. The stock Tamiya top-shaft gear is retained, so the factory-perfect gear mesh isn't changed.

The rear transmission was modified with Cross's lightweight countershaft. This saves an impressive 8 grams of rotating weight, and that should help the drive train accelerate and decelerate more quickly. Before reinstalling the drive belt, I replaced both of the stock multi-piece pulleys with one-piece aluminum units. Although they're 1 gram heavier than stock, the hard-anodized aluminum should reduce belt drag, and the one-piece design eases maintenance.

A truly stunning piece of machine work is hung off the front tranny: an artfully relieved gear cover showcases the spur and counter gears and lends the transmission the look of a fine Swiss watch—beautiful, to be sure, but ultimately impractical for the pebbly world of parking-lot racing. The Cross gear cover is literally an open door to debris, so I'm saving mine for carpet competition. Beneath the lower gear cover, a gold-

(Continued on page 178)

The Cross aluminum suspension components increase the precision of the TA03; Cross parts—32 grams; Tamiya—22 grams.

IN THE WORLDS!"

-Masami Hirosaka, at the World's Award Banquet

Reedy Modifieds powered Masami Hirosaka's new RC10B3 toTop Qualifier Honors, turning the FASTEST LAPS of any 2WD car. And, Reedy Motors took Masami's Yokomo MX4 to Top Qualifying Honors in 4WD before powering away from the rest of the field to capture the 1997 IFMAR 4WD World Championship! In fact, Reedy Motors were in twice as many cars in the 4WD A-Main as the next leading brand of motor!

REEDY Modifieds

Associated Electrics • 3585 Cadillac Ave., Costa Mesa, CA 92626

http://www.rc10.com

ad #1032-120

(Continued from page 173)

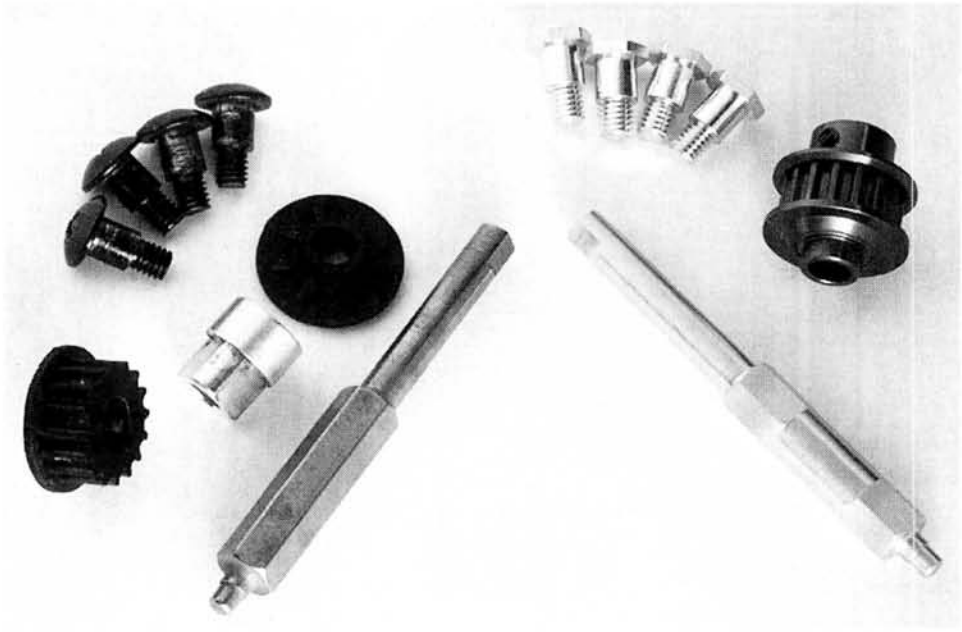
anodized motor plate/heat sink lends extra support to the motor-mounting screws while it helps dissipate heat.

I finished the gearbox upgrades by installing Tamiya's ball diffs in both ends of the car. I assembled these using the "Dave Jun" method detailed in Dave's "Build a Nats-Winning TA03" (*R/C Car Action*, February '98). To get the most out of the smoothly turning diffs, I also installed a complete set of Cross universal drive shafts. With both gearboxes built, I was ready to bolt on the chassis.

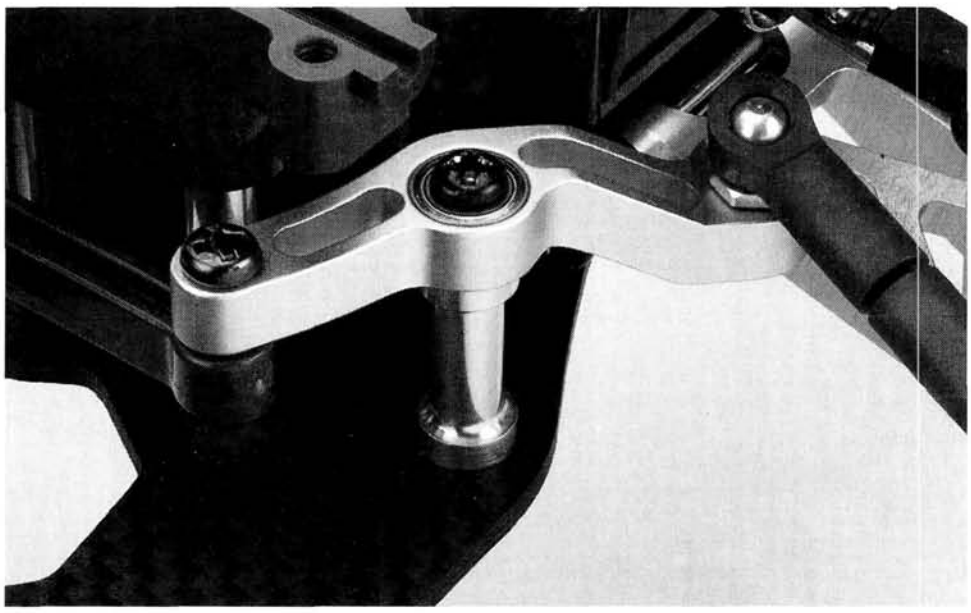
WOVEN WONDER

Cross turned to carbon-fiber plate for the TA03 chassis. The new chassis plates do not alter the TA03's wheelbase, but the lower plate offers more room for the radio gear and ESC than Tamiya's tub or fiberglass chassis.

The steering servo may be centered on the chassis as required by either Tamiya chassis, or it may be offset to allow more room for the ESC; I chose the offset position to better accommodate my Tekin G12cIII.



Cross really trims the fat on the small stuff; the aluminum kingpins (upper right) shave 6 grams. The aluminum countershaft (right) lops off 8, but the hard-anodized pulley adds a gram to bring the total countershaft/pulley (right) combo down to a total weight saving of 7 grams.



Cross's lightweight bellcranks add to the precision of the front end. The stock bushings were replaced with bearings. The bellcranks can be used with the stock Tamiya bulkhead, but I chose to save weight by installing the Cross standoffs.

The Cross chassis positions the battery in the same place as the TA03F-Pro and will even accept Tamiya's battery holder. With weight saving in mind, I omitted the battery holder and opted for Pure-Tech* battery straps; in addition to trimming off a few more grams, the chassis' strap slots permit the battery to be mounted farther aft than the molded holder allows.

FINAL TOUCHES

As a stealthy weight-savings maneuver, I installed a set of Cross aluminum ball ends. You might not expect to save much weight by using these small parts, but 14 ball ends add up. The Cross units tip the scales at 6 grams versus a chunky 14 grams for the stock pieces.

To add some adjustability, turnbuckle camber links replace the stock links. Cross takes a low-key approach here: steel turnbuckles and pivot balls are captured by plastic rod ends—nothing trick, just purely functional. Finally, I added Cross "T2" wheels and belted High Grip Radial tires. When I **had** last rubbed fenders with the G-man, slicks weren't the hot setup on the *Car Action* test lot, so the treaded radials were a logical choice.

DRIVE TIME

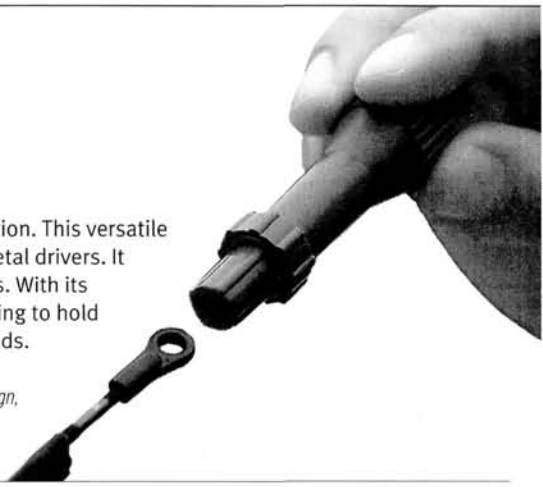
How does my "new" TA03 handle? Well, a lot like the old one, actually!—no surprise really, as the car's geometry is unchanged. The best traits of the front-motor TA03 platform still shine through; it's a well behaved, easy-to-drive car that gives plenty of warning before it slips past the limits of traction. But that isn't to say that the car hasn't been transformed; the reductions in both static and rotating weight allow the modified 03 to squirt out of corners like a recoiling bungee-jumper, and the front one-way unit helps it to snap into turns with authority.

As nice as the driving experience is, however, I must admit that I get the most satisfaction from just handling the car and admiring it as a piece of industrial design. I can't help but be impressed by the way the bearings slide into the unyielding aluminum hubs with just the slightest effort, the careful milling away of unnecessary material from the steering bellcranks and the simple efficiency of the slab-sided suspension arms. There's plenty of mind candy in the TA03's plastic parts, too; you can't really appreciate a Tamiya car until you've attempted to puzzle out how such intricate parts can escape from a mold. Whether you're driving or admiring the Cross/TA03, it is an impressive machine.

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

WHAT'S new

Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by *Radio Control Car Action* or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in *Radio Control Car Action*. Manufacturers! To have your products mentioned here, send press releases to *R/C Car Action*, What's New, 100 East Ridge, Ridgefield, CT 06877-4606.



DURATRAX

Ball-End Driver

Here's another handy little tool to add to your pit box collection. This versatile ball-end driver has two inserts that will do the job of four metal drivers. It can drive large or small ball ends with open or cupped styles. With its comfortable grip, you no longer have to work up a sweat trying to hold and twist Associated, Losi, Kyosho, Tamiya and other ball ends.

Part no.—DTXR1126; price—$3.99.

DuraTrax; distributed by Great Planes Model Distributors, P.O. Box 9021 Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

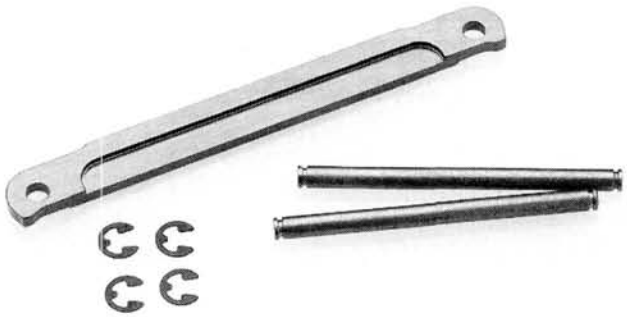
DYNAMITE

Blue Thunder

Dynamite is well-known for its high-performance nitro race fuels. Many racers and gas-car enthusiasts prefer its extremely reliable mixtures, but storing them where contaminants such as moisture can't come in contact with the fuel can be tricky. Dynamite has eliminated this problem by producing convenient quart sizes that provide enough fuel to fill up a few tanks of fun. The quarts are available in popular 10- to 40-percent-nitro blends.

Part nos and prices: DYN 2310 (10 percent) $9.50; DYN 2320 (20 percent) $11.50; DYN 2330 (30 percent) $14.50; DYN 2340 (40 percent) $17.50.

Dynamite; distributed by Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 352-1958; fax (217) 352-0355.



TRINITY

Front Suspension Brace

Trinity's Team Kinwald front-suspension brace for Traxxas is machined of lightweight aluminum and anodized in a brilliant blue finish. It also comes with long hinge pins to beef up the stiffness of the front end, thus reducing the chance of breaking a bulkhead. The brace fits the Rustler, Stampede, Bandit, or any car with the no. 2530 bulkhead.

Part no.—TK3021; price—$10.99.

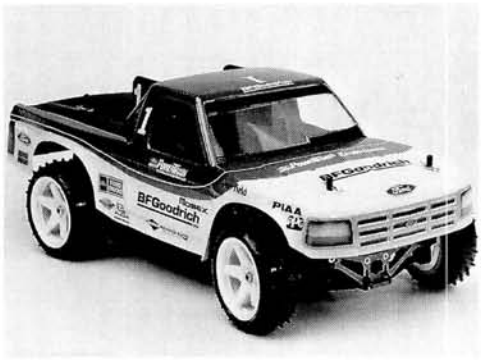
Trinity Products Inc., 36 Meridian Rd., Edison, NJ 08820; (732) 635-1600; fax (732) 635-1640.

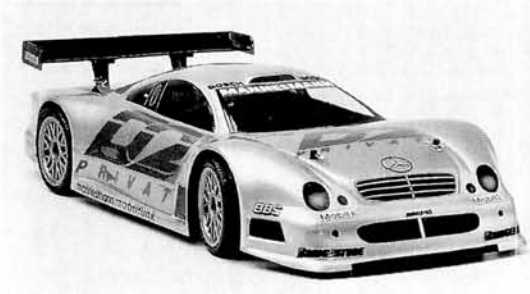
TENTH TECHNOLOGY

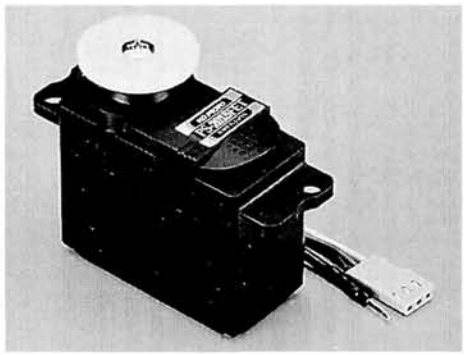
Streetwise Series

Tenth Technology is known for its 4WD Predator on- and off-road racers. Now these exciting vehicles have evolved into the Streetwise Series. The new cars have a one-piece, low-CG, composite chassis, and the simplified, shaft-driven transmission is as efficient as ever. The inboard shocks are protected from dirt, dust and collisions. Other features include a set of 16 ball bearings, front and rear diffs, adjustable camber, oil-filled shocks and 48-pitch gears. The Streetwise models will be available as on-roaders with a Mercedes body and as off-roaders with a stadium-truck body. Available at your hobby dealer, or call for more information.

Tenth Technology; distributed by Great Planes Model Distributors, 2904 Research Rd., P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-1104; website http://www.hobbies.net/dynaflite.







KO PROPO

High-Performance FET Servo

KO Propo is proud to release its PS-2015 FET servo. This high-performance servo delivers high torque and high speeds—great for the growing sedan classes. The servo features a coreless motor, FET technology and dual ball bearings at an operating range of 7.2 volts.

Part: KOPM1115; price—$139.99.

KO Propo; distributed by Great Planes Model Distributors, P.O. Box 9021 Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

DAHM'S

Spitfire Truck Body

Looking for an outrageous new truck body for any Team Associated truck or Tamiya Stadium Blitzer? Then check out the new Spitfire! This body features narrow, low, sleek, aerodynamic styling with cooling vents, molded trim lines, front and rear spoilers. An extra rear spoiler, decals and instructions for molding the raised side panels are included.

Part no.—D221; price—$19.98.

Dahm's Racing Bodies; P.O. Box 360 Cotati, CA 94931; (707) 792-1316; fax (707) 792-0137.

SCHUMACHER

SST 2000 '98

The SST 2000 '98 is yet another addition to Schumacher's advanced line of touring cars. The new SST has many new features: side-saddle chassis layout with motor and speed control on opposite sides for better balance; smoothly operating lightweight alloy differentials; increased caster in the wishbones; a "slim" top deck for controlled chassis flex, and a whole lot more! All this, plus the advantage of factory assembly, can put you in the winners' circle. The SST 2000 '98 has already proved itself a winner in British, French and American nationals.

Part nos. and prices—U411R (Peugeot 406 BTCC) $335.92; U412T (Racing Chassis) $335.92; U419B (BMW M3) $335.92.

Schumacher, 6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; fax (813) 889-9593.

DURATRAX

1700mAh Battery Pack

Whether you enjoy backyard bashing or full competition, driving time all comes down to your battery. With DuraTrax's 1700mAh Sanyo packs, expect long run times with high performance. These packs are "quad welded" for security and held in with "shotgun tube" holders, all at a low price.

Part nos. and prices—DTXC 2070 (6-cell flat) $49.99; DTXC 2071 (7-cell flat) $59.99; DTXC2072 (7-cell hump) $59.99.

DuraTrax; distributed by Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

KYOSHO

Mantis Series Expansion

Kyosho has released four more stunning cars in its Mantis lineup. The 90-percent-assembled Mantis is just what beginners need to get going quickly and easily. With independent, double-wishbone suspension, torsion-coil front and rear springs, one-piece tie rods, road-hugging rubber tires, injection-molded body and some serious hop-up potential, these cars have endless possibilities as parking-lot racers. Choose electric (EP) or gas (GP) body models.

Part nos. and prices—Renault Laguna 2WD (KYOC0148 EP) $189.99; (KYOC0405 GP) $299.99; Fina BMW 2WD (KYOC 0149 EP) $189.99; (KYOC GP) $299.99.

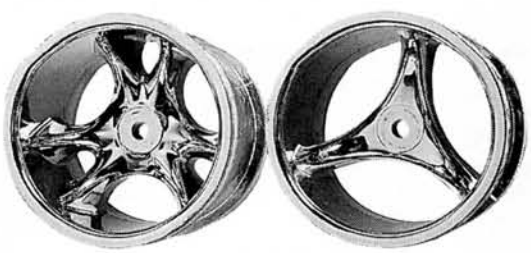
Kyosho; distributed by Great Planes Model Distributors, P.O. Box 9021 Champaign, IL 61826-9021; (217) 398-6300; fax (217) 398-0008.

RPM

Talonz and Claws Chrome Wheels

A great-looking pair of wheels will make any car look good; that's why RPM produces these stylish units. Extra rigid and precisely molded, the wheels have a bright chrome-like finish with pre-stripped bonding area—and, as you can see, killer looks. Available for Team Associated and Team Losi vehicles and in white, too, if that highly polished look isn't your thing. Call RPM for part numbers and pricing.

RPM, 14978 Sierra Bonita Ln., Chino, CA 91710; (909) 393-0366; fax (909) 393-0465.



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SANYO

CARE AND FEEDING OF STREET SPEC BATTERY PACKS

Street Spec cells withstand abuse well, but care is still advised for longest life. We suggest charging between 4 and 5 amps; this is a good compromise between performance and cell life. Charging lower will yield longer cell and pack life; charging at higher rates will reduce overall cell life but may improve pack voltage. Try to time your charge so that your pack has finished charging about 5 minutes before you are ready to race. Then, just before you race, re-peak your pack. This can be done at 5 amps and will give you a little extra voltage at the start of the race. We do not recommend charging Street Spec battery packs at more than 6 amps.

After you have finished racing, you need to discharge your pack correctly to keep it in top racing shape. If you regularly drive your car or truck until it has slowed significantly or stops, you may not need to do anything more. If you do not run out your pack, or if you still have a lot of energy left in your pack after a qualifying or Main run, you must extract the remaining power from the pack before you recharge it. Many devices can perform this task; if your charger has a discharge function, use it. We prefer a 20A discharge rate. Discharge the pack to 4.2 volts at 20 amps (this is lower than you would discharge RC-1700 or RC-2000 cells because the Spec cells have a lower voltage output). This can also be done with many discharging devices on the market. After you have discharged your Street Spec pack to 4.2 volts, take a 30-ohm resistor such as those sold by Trinity and connect it across the leads. This will slowly discharge the pack and equalize all the cells without reversing them. This can be safely left on until the next time you race or removed after a couple of days.

The next time you go racing, remove the resistors from your packs about 30 minutes before you start to charge them. This will allow the voltage to rise slightly in the pack and keep your peak detector charger from turning off. Try to charge and run your pack at least once on race morning in practice. After running it, discharge it down to 4.2 volts and then let it sit until you charge it for your heat or Main. Running the packs once on race morning in practice will "wake them up," and they will have a better voltage output on the second charge. There are many good chargers on the market, and a few that are not so good. We recommend a peak detection type of charger for best performance. If you can afford it, buy a charger with a discharge function built in. It makes life much easier.

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ASSOCIATED RC10B3

(Continued from page 67)

but the B3 remained composed through these rough sections. By the time the 4-minute tone sounded, I had improved my best time by three laps. Despite my difficulties in the second qualifier, this third-round run put me into the A-main.

I used the break before the mains to clean the tires, re-peak my best pack and eat lunch (turkey on wheat, pickle, Coke), but made no setup changes. Then it was showtime. The straightaways were a blur as the Reedy* cells and motor laid down some serious power through the Stealth transmission.

Turning is the B3's specialty, and it ate up the tight turns and sweepers with equal aplomb. I noticed a slight push when entering a sweeper off the high-speed straight, but I was back on the throttle just a quarter of the way through and was able to exit the turn with a definite advantage.

The washboard whoop section was a real test of the new Quadra-symmetric suspension, but the B3 passed the test like Einstein taking the SATs; the car skated across the tops of the bumps and didn't show any sign of getting out of shape. The B3 also took the triples in its stride. It wasn't difficult to set up for the short run, dump the throttle and clear all three jumps. The speed needed to perform this feat, however, landed the car past the turn that followed the jump, so I chose to pop over the first two jumps with a burst of throttle and then roll over the third to maintain my speed and take the turn tightly.

FINAL THOUGHTS

Although it was a world champion, the popular perception was that the B2 was suited only to steely nerved professionals and not the average racer—great for Matt Francis on a groomed track, but not as good for the R/C everyman racing on untamed ground. The B3 is a different animal. You can build it, put it down on the track—any track—and do well without having the driving skills of a pro! By listening to the comments of its team drivers and you, the "average" driver, Associated has designed a buggy that retains the laser-precise feel of a true racer while remaining easy to drive and compete with, no matter what the driver's experience level.

**Addresses are listed alphabetically in the Index of Manufacturers on page 217.* ■

Track Directory

YOUR 1998 TRACK GUIDE

FREE! Track owners! You can be included in this directory, brought to you by Pro-Line. Just fill out the coupon on page 245.

Key to Symbols

- Indoor
- Outdoor
- Off-road
- Oval
- Dirt oval
- Carpet
- Concrete
- Asphalt
- On-site hobby shop
- AC power
- Auto lap-counting
- Food available

ALABAMA

Beacon Point RC Raceway, 15717 Beacon Point Drive, Tuskaloosa, AL; Don, (205) 333-8679

Hobbytown USA Raceway, 450-Q Schillinger Rd. N., Mobile, AL 36608; Rob & Kari Baker, (334) 633-8446

Lagoon Park R/C Raceway, 2730 Lagoon Park Dr., Montgomery, AL 36109; Alex Love, (334) 272-6438

Phenix Raceway & Hobby, 2006 Opelika Rd., Phenix City, AL 36867; Chris Watson, (334) 298-9786

R/C Hi-Tech Raceway, 3303 Meridian St., Huntsville, AL 35811; Rick Chambers, (205) 539-1347.

R/C Thunder Tracks, 1530 Schillinger Rd., Mobile, AL 36675; Jerry Hurst, (334) 645-2787

ALASKA

Fairbanks R/C Car Club 510 Janea Ave. Fairbanks, AK 99701; Dan Anderson, (907) 456-5494

ARIZONA

Cottonwood R/C, S. 6th St., Cottonwood, AZ 86322; Sal Cirincione, (520) 567-6830

Havasu R/C Raceway, 1400 S. Smoketree (Rotary Park), Lake Havasu, AZ 86403; Jeff Roe, (520) 855-2226

HobbyTown Mountain Raceway, 1500 E. Cedar Ave., Cedar Hills Shopping Center, Flagstaff, AZ 86004; Richard, (520) 214-9887

HobbyTown Raceway, 13802 N. Scottsdale Rd. Scottsdale, AZ 85250; (602) 948-3946

HobbyTown Raceway, 1915 East Baseline Rd., Gilbert, AZ 95234; Dennis, (602) 892-0405

Hobbytown Raceway, 1102 E. 22nd St., Tuscon, AZ 85704; (520) 882-8888

HobbyTown U.S.A., 5030 E. Ray Rd., Phoenix, AZ 85044; Linda McFarland, (602) 598-5282

Quarter Flash's Squirtin' Dirt Raceway, 16301 S. Santa Rita #C, Sahuarita, AZ 85629; Dave, (520) 625-9274

R/C Sports Mania, 3550 N. 35th Ave., Phoenix, AZ 85017; Brian Dick, (602) 278-3671

Scottsdale R/C Raceway, 3023 N. Scottsdale, Scottsdale, AZ 85251; Scott Anfinson, (602) 945-2186

Thunder Mountain R/C, 1325B Plaza Mavia, Sierra Vista, AZ 85635

USA Speedway, 5947 W. Alameda, Glendale, AZ 85310; Michael Fleek, (602) 516-1398

ARKANSAS

A.R.C.C.A., 13703 Pleasant Hill Rd., Little Rock, AR 72209; Jim Kifer, (501) 455-2221

Grand Slam Superspeedway, 5300 S. Zero St., Ft. Smith, AR 72901; Bryon Shumate, (501) 648-1994

Sparks R.C. Raceway, 7194 Greene 721 Rd., Paragould, AR 72450; Tommy Sparks, (501) 239-3606

CALIFORNIA

California City R/C Car Track, 8349 Jacaranda Ave., California City, CA 93505; (760) 373-3765

Cameron Park Raceway, 1305 Cameron Ave., West Covina, CA 91790; Carl A. McVey, (818) 962-1120

Cats West/Hawk's R/C Raceway, 1201 West 10th St., Antioch, CA 94509; Mike Rogers, (510) 779-1665

Cycle Art Raceway, 2211 N. Pleasant Way, Fresno, CA 93705; Jesse Shapiro, (209) 233-3665

Discount Hobby Warehouse, 7750 Convoy Ct., San Diego, CA 92111; (619) 560-9633

Freedom Park Raceway/Ventura Roadrunners, Freedom Park Dr., Camarillo, CA 93010; Chris Jones (805) 656-RACE

Greater Los Angeles R/C Racing Club, 3756 Cardiff Ave., #305, Los Angeles, CA 90034; Nikko Ko

Hobby Central Raceway, 34255 P.C.H., Unit 107, Dana Point, CA 92629; John, (619) 513-0373

Hobby Central II Raceway, 13461 Community Road; Poway, CA 92064; John, (619) 513-0373

Hobby Paradise Raceway, 1880 Art Gonzales Pkwy., Selma, CA 93662; Steve Keiser, (209) 896-4804

HobbyTown, Parktown Plaza Shopping Center, 1350 S. Park Victoria Dr. #21, Milpitas, CA 95035; (408) 945-6524

Hobby Town, 8950 Osage, Sacramento, CA 95828; Roger Hubbard, (916) 381-7587

Hot Rod Hobbies, 25845 San Fernando Rd., #21, Saugus, CA 91350; Rod Weisbaum, (805) 255-2404

Jake's Performance Hobbies, 6650 Commerce Blvd. #21, Rohnert Park, CA 94928; Jake, (707) 586-3375

Just for Fun R/C Raceway, 509 S.State St., Ukiah, CA 95482; Don, (707) 462-7305

K&M Raceway, 22474-A Barton Rd., Grand Terrace, CA 92313; (909) 783-0899

Lake Tahoe Raceway/Sierra Hobbies & Raceway, P.O. Box 9969, South Lake Tahoe, CA 96158; Mark Osser or Greg Smith, (916) 541-4555

Loki Raceway & Hobbies, 1875 Joe Crossen Dr. #B, El Cajon, CA 92020; Ed Mullen, (619) 562-7757

Lucerne Valley Raceway, 32800 Old Woman Springs Rd. #4. P.O. Box 2047, Lucerne Valley, CA 92356; Frank Rodrique, (760) 248-7305

M n M Hobbies, 4225 Prado Rd., Ste. 103, Corona, CA 91720; Joe Stanovich, (909) 272-3545

M.R. C.A.R., McGreed Loop, Merced Airport, Merced, CA 95340; (209) 723-6662

Nor-Cal Mini-Speedway, 519 Bush St., Woodland, CA 95695; Steve Van Atta, (916) 668-5678

Perris Recreation R/C Track, 120 N. Perris Blvd., Perris, CA 92370; (909) 943-6603

R/C Racing Center and Hobbies, 9842 Channel Rd., Lakeside, CA 92040 (San Diego County); Russ or Cindy Escalera, (619) 443-2270

R/C Veladrome, P.O. Box 2403, Julian, CA 92036; Peyton Read, (760) 765-3463

R.A.C.E., 724 Mangrove Ave., Chico, CA 95926; HobbyTown U.S.A., (916) 899-2977

Race Corner of Marin, 14 Commercial Blvd., #111, Novata, CA 94949; Mike, (415) 883-0388

Race Prep Raceway, 20115 Nordhoff, Chatsworth, CA 91311; Steve Dunn, (818) 709-6800

Racer's Haven Raceway, 7401 White Lane #12, Bakersfield, CA 93309; Martin Buchannan (805) 835-0441

Radio Control Products, 201 E. Magnolia Blvd. #148, Burbank, CA 91502; Tab, (815) 846-4208

Rams 1/8-scale Gas and 1/10 scale Gas On-Rood, Mission College, Lot B, 3000 Mission College Blvd., Santa Clara, CA 95054-1897;Steve Tsuruda, (416) 675-5609

Ranch Pit Shop, 1655 E. Mission Blvd., Pomona, CA 91766; Ken Shintani, (909) 623-1506

Ripon R/C Speedway, 701 N. Acadia Ave., Ripon, CA 95366; Dan Tanis, (209) 599-5160

Simi Valley Groundpounders, 205 Tierra Rejada Rd. (behind Simi Valley Drive-In), Simi Valley, CA 93065; Jack Kasten, (805) 584-8211

So. Cal R/C Raceway, 19118 Brookhurst St., Huntington Beach, CA 92646; Jim Blauvelt, (714) 963-7484

S.R.S Offroad Raceway, 1038A N. Davis Rd., Salinas, CA; Randy Loveless, (408) 424-4044

Team Air Racing Club, 18208 Imperial Hwy., Yorba Linda, CA 92686; Don or Nicky, (714) 579-7488

Track Heaven, 6196 Child's Ave, San Diego, CA 92139; Loure, 475-2020

Tri-Valley Auto Racers, Livermore Elks Club, 940 Larkspur, Livermore, CA 94550; Mike Stone, (510) 455-6833

Ultimate Hobbies, 2143 N. Tunstin Ave. #6, Orange, CA 92665; Cliff Murukami, (714) 921-0424

Valley R/C Racepark, 146 S. Santa Fe St., Hemet, CA 92344; Valley Wide Recreation, (909) 925-9331.

COLORADO

MHOR R/C Raceway, 15540 East Batavia Dr., Aurora, CO 80011; Jess Brockman, (303) 343-0151

S&T R/C Raceway, 323 Auburn Dr., Colorado Springs, CO 80909, Tim Bishop, (719) 574-2910

Valley West R/C Club, 2202 I Road, Grand Junction, CO 81505; Waymond Williams, (970) 242-8846

CONNECTICUT

East Lyme R/C Kar Klub, Society Rd., East Lyme, CT 06333; (860) 442-4343

K/N R/C Speedway Inc., West St., Stafford Springs, CT 06076; (860) 684-9896

Manchester Recreation and Entertainment Center, 290 Kott St., Manchester, CT 06040; Peter Tierinni, (860) 646-6243

R/C Madness, 640 Enfield St., P.O. Box 64, Enfield, CT 06082; Christopher Marcy, (860) 741-6501

Xtreme Radio Control, 469 Danbury Rd., New Milford, CT 06776; Paul or Pete, (860) 354-4703

DELAWARE

DARCAR Club, Blue Hen Corporate Center, Rte. 113, Dover, DE; Steve, (302)-697-8350.

Eastcoast Off-Road, Rt. 3 Box 256 A, Laurel, DE 19956; Darrin Shockley or Steve Nelson, (302) 875-8160

The Hobby Outlet: Tracks of the Outlet, Salisbury Rd., Dover, DE 19901; Steve, (302) 697-8350

Hobby Stop Speedway, RD4, Box 100, Rte. 13, Seaford, DE 19973; Remy Haynes, Jr., (302) 629-3944

FLORIDA

B+T R/C Central, 811 Playground Rd., Ft. Walton Beach, FL 32547; (904) 863-1666

Branford R/C Speedway, Rt. 3, Box 240, Branford, FL 32008; (904) 935-0758

Broward County R/C Race Club, Mills Pond Park, Ft. Lauderdale, FL; Ed Decembero, (954) 525-3304

Coral Springs Roadrunners, P.O. Box 9632, Coral Springs, FL 33075; John Argentino, (954) 925-8284

First Coast Speedway, 6410 Waltho Dr., Jacksonville, FL 32211; Bob Thompson, (904) 743-2161

5-Fifty-5 R/C Raceway, State Road 555, Bartow, FL 33830; John Goepferich, (941) 678-9111

Frontier Race Track, 15260 N.E. 244th Ave., Salt Springs, FL 32134; Harold Reel, (352) 685-2881

Gainesville R/C Speedway, P.O. Box 693, Melrose, FL 32666; 130 NW 14th Ave., Gainesville, FL 32601; (352) 495-3600

Greater Orlando Auto Racers, 970 Keller Rd., Altamonte Springs, FL 32714; Dave Mottin

Hobby World Raceway, 7273 103rd St., Jacksonville, FL; Greg, (904) 772-9022

The Hobby Stop Raceway, 5765 Manatee Ave. W., Bradenton, FL 34209; Rich Konnen (941) 798-9638

The Hobby Stop Raceway, 2454 Land O'Lakes Blvd., Land O'Lakes, FL 34639; Rich Konnen, (813) 948-0606

Miami R/C Raceway, 12546 S.W. 88 St., Miami, FL.

Minnreg R.C. Club, 6340 126th Ave. N., Clearwater, FL 34624; David Fox, (813) 787-6032

Monster Hobbies, 231 SE 1st Ave. Boca Raton, FL 33432; Steve Augustus, (561) 392-5447

Morris Kohl's Raceway and Hobby Shop, 1202 W. Waters Ave., Tampa, FL 33604; Morris Kohl, (813) 931-1626

My Rose, 1695 W. Indiantown Rd., Jupiter, FL 33458; Mark Watson, (561) 744-3800

NORRA, 3300 Santa Barbara Blvd., Naples, FL 33999; Jerry Pecar, (941) 455-9065 or Mark Benfield, (941) 263-6861

Ocala Radio Control Car Club, 3500 SE 30th Terrace, Ocala, FL 34471; Steve Snook, (352) 694-5147

Paul's Stadium Raceway, 4511 W. Dr. M.L. King Jr. Blvd., Tampa, FL 33614; Paul Surette, (813) 872-8662

PBG R/C Motor Park, 6351 Barbara St., Palm Beach Gardens, FL 33418; Doug Gleason, (561) 743-9791 or Tim Case, (561) 627-2608

Pro Hobbies Speedway, 715 N. Lake Pleasant Rd., Apopka, FL 32712; (407) 886-4615

Port St. Lucie Racing, 3626 SW Rivera St., Port St. Lucie, FL 34953; Frank Spadavecchia, (561) 336-8711

River City R/C Car Club, 9711 Sharing Cross Dr., Jacksonville, FL 32257; Bill Fraden, (904) 268-1948

Sarasota RC Speedway, 8475 Cooper Creek Blvd., University Park, FL 34201; Jim Wilson, (941) 358-7047

South Daytona R/C Raceway, 2121 S. Ridgewood Ave., South Daytona, FL 32119; Mike Bean, (904) 426-6481

South Palm Beach Racers, South County Regional Park, West Boca Raton, FL 33486; Mike Fazio, (561) 338-5367

Superior Hobbies R/C Parking Lot Racing, 430 E. Hwy. 436, Ste. #106, Casselberry, FL 32707; Rob Michael, (407) 834-9299

Tallahassee R.C. Raceway, Tom Brown Park, Easterwood Dr., Tallahassee, FL 32311; Roland Costine, (904) 671-2814

Tampa Bay R/C Club, P.O. Box 10224, St. Petersburg, FL 33733; Dick Gillette, (813) 526-0744

Tampa Hobbytown R/C 4 Slot Car Raceway, 15702 N. Dale Mabry, Tampa, FL 33618; Max and Judy Rosenroth, (813) 968-7233

Winterset Raceway, U.S. Rt. 27 South, Winterset Motel, Sebring, FL 33872; John Bisbee or Mac Mixer, (941) 699-1140 or (941) 385-4448

GEORGIA

Dalton Raceway, 2300 Chattanooga Rd., Dalton, GA 30720; (404) 226-6699

Echeconnee Superspeedway, 2149 Richardson Dr., Macon, GA 31206; Andy Thompson or Cliff Kline, (912) 788-8731

Emerald City R.C. Speedway, Highway 40 East, East Dublin, GA; Terry Cook, (912) 272-3856

Hobby Town Raceway, 2301 Airport Thruway, Columbus, GA 31904; Frank Bastos, (706) 660-1793

HobbyTown Raceway, 225-B Tom Hill, Sr. Blvd., Macon, GA 31210; Marcus Lee, (912) 474-0061

Lake Mayer Raceway, 1430 Dale Dr., Savannah, GA 31406; (912) 598-9709

The Racer's Edge, 1530 Hwy. 19 N., Thomaston, GA 30286; Roger or Mark Walls

Sandy Cross Speedway, Rt. 1, Box 1071, Hwy. 51, Royston, GA 30662; Morris Phillips or Wayne Fowler, (706) 245-9573

SHiLOH R/C Raceway, 6362 Shiloh Rd., Hahira, GA 31632; Doug Burnett, (912) 794-2507

Silver Wings Raceway, 5611 Riverdale Rd., College Park, GA 30349; M. Bradshaw, (770) 991-2225

Stinger RC Super Speedway, 3769 Maysville, Rd., Commerce, GA 30529; Deric Sauls, (706) 335-5006 or (706) 335-9044

Sugar Bowl R/C Speedway, 5272 Nelson Brogdon Blvd., Sugar Hill, GA 30518; Shelley Bailey, (770) 945-6709

Valdosta Hobbies, 3998 Inner Perimeter Rd., Valdosta, GA 31602; Ron Hood, (912) 244-2101

HAWAII

Garden Isle R/C Racers, 5855 Ahakea St., Kapaa Kauai, HI 96746; Arnold Morales, (808) 823-0856

Kakaako Water Front Park Dragway, 98-029 Hekaha St., Bay #32, Aiea, HI 96701; James Inkyo, (808) 487-5155

Keehi Lagoon Park, Leeward Community College, Waipahu, HI 96797; (808) 676-5486

Maui R/C Racing Association, 430 Hookahi St., #13, Wailuku, HI 96793, Tritech R/CHobbies, Radio Control Association, (808) 244-0526

Pearl City Raceway, 98-029 Hekaha St., Bay 32, Aiea, HI 96701; James Inkyo, (808) 487-5155

Radio Control Hawaii, 474 Kalanikoa St., S-104, Hilo, HI 96720; Glenn Shiroma, (808) 935-5629

Team PRC Racing Club, 176 Mamo St., Hilo, HI 96720; Charlie Kawamoto, (808) 935-3561

IDAHO

Capital Dirt Burners, 301 N. Bruce, Boise, ID 83712; Mike Ard, (208) 345-3906

Dirt Stuff Plus, 5344 N. Yellowstone Hyw., Idaho Falls, ID 83401; Brian Krah, (208) 522-7576

ILLINOIS

AJ's Raceway & Hobby, 10211 Keslinger Road, Dekalb, IL 60115; A.J. Schultz, (815) 756-2772

C.I.R.C.A., 905 Bibbs St., Jacksonville, IL 62650; Sport 'n' Hobby, (217) 245-1375

C&R Hobbies, 39 E. Jones, Milford, IL 60953; Ray Craighead, (815) 889-4073

Dan's Hobby World, 18415 S. Halsted St., Glenwood, Il 60425; Dan, Bruce or Josh, (708) 754-7988

Glenwood Roseway, 18417 Halsted, Glenwood, Il 60425; Don's Hobby World, (708) 754-7988

G&R Raceway & Hobbies, 533 Bank Lane, Highwood, IL 60040; Randy Rose, (847) 432-9600

HobbyTown Raceway, 9346 Virginia Rd. Lake in the Hills, IL 60102; Mike Hollingsworth, (847) 458-1777

HobbyTown Raceway, 2103 N. Verterans Pkwy., Bloomington, IL 61701; Gary Pritts, (309) 664-4451

Leisure Hours R/C Raceway, 24121 W. Theodore, Bldg. 1, Plainfield, IL 60544; Scott Hill, (815) 439-1777 (track), (815) 439-1477 (shop)

Machesney Park, 1220 Shappert Dr., Machesney Park, IL 61115; (815) 282-1311

Marty's R/C Hobby, 1335 E. Broadway, Bradley, IL 60915; Gail or Marty, (815) 933-8441

Mitey Motor Speedway, 1109 N. Bloomington St., Rte. 23., Streator, IL 61364; Doug, (815) 672-4212

Monee R/C Raceway, 26049 Ridgeland Ave., Monee, IL 60449; Roy or Roberta Moody, (708) 534-2422 (track), (708) 799-5597 (office)

Pontoon Raceway, 3670 St., Rte. 111 Granite City, IL 62040-4304; Pat or Skip, (618) 931-1206

Outlaw R/C Speedway, 1614 Broadway, Mattoon, IL 61938; (217) 234-6229

R/C Workshop, 3100 S.W. Adams St., Peoria, IL 61605; Al Kretz, (309) 673-4860

Radio-Active Raceway, 751 N. Bolingbrook Dr., #15, Bolingbrook, IL 60440; Jim, (630) 759-7557

Rector's R/C Raceway, RR 3, Box 104, Albion, IL 62806; Tim Wolfe, (618) 842-9379 (M-F), (618) 446-3282 (Sun.)

Shiloh Eagles Superspeedway, 308 N. Virginia Ave., Belleville, IL 62220; (618) 277-6030

SIRCAR Raceway, 1200 N. Marion, Carbondale, IL 62901; (618) 549-5885

Stanton Hobby Shop, 4718 N. Milwaukee, Chicago, IL 60630; Kevin Kane, (773) 283-6446

Valley Farms R/C Raceway, 706 Bypass 20, Cherry Valley, IL 61016; Dean or Debbie, (815) 332-4516 or (815) 547-5984

Wep Speedway, RR #2, Box 44 Lawrenceville, IL 62439; Bill Poe

INDIANA

Bremen Racing Ent., 308 N. Bowen, Bremen, IN 46506; Dale Heuberger, (219) 546-3807

Dirt Sligger's Raceway, 546 North 12th Ave., Beech Grove, IN 46107; Phil Riley, (317) 787-3815

Elliott's R/C Raceway, 2140 North Plate, Kokomo, IN 46901; (317) 452-0163

G.R.C.C.C. Inc., 1651 W. Franklin St., Elkhart, IN 46516; Pete Russell, (219) 293-1827

Hardesty R/C Raceway, 11 East Plymouth St. Hamlet, IN 4653; Max Hardesty, (219) 867-8600

Hobby Barn Raceway, 1950 Springhill, Terre Haute, IN 47802-9694; (812) 299-5773

Hobbytown U.S.A., 5385 E. 82nd St., Indianapolis, IN 46250; Bill Scott (317) 845-4106

K&L Hobbies & Raceway, 3275 North 525 W. LaPorte, IN 46350; (219) 324-0353

Kokomo Hobby & Radio Raceway, 1108 E. Markland, Kokomo, IN 46901; (317) 457-5060

P&T Hobbies and Raceway, RR 2 (Hwy. 60), Mitchell, IN 47446; Paul Weber or Tom Logsdon, (812) 849-6666; email: pnthobby@kiva.net

Race Street Hobbies, 1126 1/2 Race St. New Castle, IN 47362; Jim Burke, (765) 521-4888

RC Barn, 310 N 125 W, Monroe, IN 46772; Mark Lengerich, (219) 692-6600

R.C.R.C. Raceway of Salina, 1300 E. Crawford, Bill Burke Park, Salina, KS 67401; Calvin Calp, (913) 823-9588

R/C World of Indiana, 2264 West U.S. Hwy. 36, Lynn, IN 47355; Joe Kolp, (317) 874-2464

Rimfire Raceway and Hobby Shop, 8 Wood Ct., Hebron, IN 46341; Sandra Eaton, (219) 996-6288 (shop), (219) 987-2803 (home)

The Rink, 7900 Whitcomb, Merrillville, IN 46410; Don Reiner, (219) 769-8113

Rod's Off-Road R/C Track, 800 N. Division, Bristol, IN 46507; Rod Harms, (219) 848-7848

Stout Field Raceway, Greenwood Hobbies, 205 S. Madison, Greenwood, IN 46142; (317) 888-7256

IOWA

Delb's Speedway, 423 11th Ave. So., Clinton, IA 52732; Rusti's Miniatures and Hobbies, (319) 243-2697

Dubuque R/C Speedway, Dubuque County Fairgrounds, Dubuque, IA 52001; Paul Conlon, (319) 556-2736

Hobby Haven, 7672 Hickman Rd., Des Moines, IA 50322; Jim, (515) 276-8785

Inside Challenge, 2028 Main St., Keokuk, IA 52632; Dan Hodges, (319) 524-2225

Iowa City R/C Racing Association, 1700 First Avenue, Iowa City, IA 52240; Hobby Corner; (319) 338-1788; fax (319) 354-6105

IROAR—Hawkey Downs Raceway, Hawkey Downs, 6th St. S.W., Cedar Rapids, IA 52404; Dave Kleinschrodt, (319) 556-8524

Manly R/C Club, Box 23 (Hwy. 65), Manly, IA 50456; Bruce Hill, (515) 454-2025

Marble's Raceway, 4685 SE 40 St., Des Moines, IA 50317; Rick Marble, (515) 262-7507

Mr. Car Raceway, P.O.Box 1112, Central Iowa Fairgrounds, Marshalltown, IA 50158; Jim Gossett, (515) 483-2234

Outback Speedway, 403 State St., Guthrie Center, IA 50115; Helens Enterprises, (515) 747-3064

Radio Control Raceway Park, 2100 First Ave. N., Fort Dodge, IA 50501; Bernie Halverson, (515) 576-3780

Riverside Raceway, Veteran's Park, Algona, IA 50511; Mike Beisch, (515) 295-9352

Shentona Speedway, 1215 W. Lowell, Shenandoah, IA 51601; Doug Cross, (712) 246-5984

Wild Bill's Raceway, 901 W. Jones, Knoxville, IA 50138; William Anderson, JR. (515) 842-5973

KANSAS

Hobbytown USA, 2016 W. 23rd, Lawrence, KS 66046; Kevin Decemberus, (913) 865-0883

Mike's R/C Hobbies, 121 SE 29th St., Unit #3, Topeka, KS 66605; Mike Barnard, (913) 266-5767

Ottawa Outlaw Raceway, 412 South Main, Ottawa, KS 66067; Tom Wilson, (913) 242-1450

R/C World Raceway, 217 Brownie Ave., Scranton, KS 66537; John and Kyle, (913) 793-2313

RCRC Raceway, 507 N. 4th, Atwood, KS 67730; Bob Dunker, (913) 626-3261

KENTUCKY

B&A Hobbies RC Raceway, 1741 Schrem Rd., Owensboro, KY 42301; William Rone, (502) 683-9776; fax (502) 686-7551

Dixon's R/C Raceway, RR2, Box 505, Hazard. KY 41701; Jeff Dixon, (606) 436-1902 or (606) 436-9559

Johnny's Speedway, 3114 North St., LLoyd Greenup, KY 41144; Charles, (606) 473-0075

Pit Stop Hobbies, 106 A Street, Benton, KY 42025; Robert Fitzgerald, (502) 527-8216

ProTrak R/C Racing, 3451 Cane Run Rd., Louisville, KY 40211; Tony Hardin, (502) 778-2657

Rick's Hobby Farm, 2089 Park Rd., Hawesville, KY 42348; Rick Early, (502) 927-8527

Terry's R/C Hobbies, 691 Garner Ave., West Liberty, KY 41472; Terry McGuire, (606) 743-2126

Trio Hobbies & R/C, 216 Redmar Plaza, Radcliff, KY 40160; Maurice Johnson, (502) 351-7547

West Kentucky R/C Hobbies, 45 Hawkins Loop, P.O. Box 21, Symsonia, KY 42082; (502) 851-3534

LOUISIANA

Al's R/C Store, 1529 Anita, Sulphur, LA 70663; Al Gaspard, (318) 625-5880 or (318) 437-8545

Baton Rouge Velodrome, 7122 Perkins Rd., Baton Rouge, LA 70815; Weldon Sharon, (504) 665-5616; open Sunday 10-4.

Cajun R/C Raceway, 728 Perry Lane, Opel, LA 70570; (504) 948-6350

Indy Speedway & Hobby, 3753 General DeGaulle Dr., New Orleans. LA 70131; Vince Sheetz, (504) 367-1891

Pontchartrain Hobby Shop, 3755 Pontchartrain Dr., Slidell, LA 70458; (504) 649-1199

Red River R/C Racers, 3203 Old Shed, Bossier City, LA 71111; David Gray, (318) 747-1863

MAINE

Clay Bowl R/C Hobbies, P.O. Box 61, Greene, ME 04236; Pat Cap, (207) 946-5003

R/C Speedway & Hobbies, 87 Main St., Fairfield, ME 04963; David Prescott, (207) 453-4588

MARYLAND

Cockeysville Astrodome Racers, 10854 York Rd. (rear), Cockeysville, MD 21030; Steve Balaz, (410) 666-2521

Countryside Raceway (portable), 406 Pamela Rd., Apt. C, Glen Burie, MD 21061; M&J's Pormotional Entertainment, (410) 761-6196

Doug's Raceway, 2935 Crain Hwy., Waldorf, MD 20601; Doug Moran, Jr., (301)843-6220

Dusty Downs, 4665 Bethlehem Rd., Preston, MD 21655; Frank Show, (410) 673-2191

Hobby Town USA, 8223-11 Elliot Rd., Easton, MD 21601; Bill Dyke, (410) 820-9308

J.R.'s Race Place, 2935 Crain Hwy., Waldorf, MD 20601; James Radford, (410) 947-2766

The Track, 16806 Oakmont Ave., Gaithersburg, MD 20877; Mimi Wong, (301) 417-9630

MASSACHUSETTS

C&C Hobby & Raceway, 562 Russells Mills Rd., So. Dartmouth, MA 02748; Charlie, (508) 997-4131

Hi-Tech Hobbies, 1681 Broadway (Rt. 138), Raynham, MA 02767; Ruben, (508) 880-5373

Megadrome Raceway, Rt. 8 Curran Hwy, North Adams, MA 01247; Bob Blanchette, (413) 743-7223

New England R/C Headquarters, 33 Fr. Devalles Blvd., Fall River, MA 02721; Chuck Gregory, (508) 673-6069

Northboro Speedway, 168 Main St., Rte. 20, Northboro, MA 01532; Bob Trimble, (508) 393-8087

West Street Hobbies, 114C Main St., Medway, MA 02053; Jim, (508) 533-1231

MICHIGAN

Akright Outback Racing, 984 Zimmer Rd, Williamston, MI 48895; Steve Akright, (517) 655-4531

Capital Area Racing Society, The Plumbers Hall, 5405 S. Logan, Lansing, MI; Dave Halsey or Brad Smith, (517) 646-8224 or (517) 484-4028

Doug's Dirtway, 5210 Colby Rd., Owosso, MI 48867; Doug Conn, (517) 729-8376

Down River R/C Association/Riders, 1519 Oak St., Wyandotte, MI 48192; Dave McCaslin, (313) 287-7405 or (313) 284-1560

Freedom Hill R/C Raceway, 29330 Coolidge, Roseville, MI 48066; Curley Grewe, (810) 776-5483

House of Hobbies, 2863 West Shore Dr., Holland, MI 49424; (616) 786-3686

JT Superspeedway, W. Golden Ave., Battle Creek, MI; Jerry or Sam, (616) 965-0116

Larry's Performance R/C's, 43665 Utica Rd., Sterling Heights, MI 48310; Larry, (810) 997-4840.

MCRC Raceway, 4601 Page Ave., Michigan Center, MI 49203; Sam Sprang, (517) 787-9161

Newberry R/C Raceway, RR #3 Box 2860, McMillan, MI 49853; Dustin Hart, (906) 293-3044

Northwest Michigan R/C Club 744 Munson Ave., Traverse City, MI 49686; Jim Ovaitt, (616) 947-6670

R&L Hobbies & Racing, 9782 Portage Rd., Kalamazoo, MI 49002; Rex Simpson, (616) 323-3686; fax (616) 329-1744

Rodgers R/C Raceway, 7463 Ridge Rd., Britton, MI 49229; George Rodgers, (517) 451-8301

Thumb Raceway, 3441 Main St., Marlette, MI 48453; Jim Wilson, (517) 635-7848

UCLA Hobbies, 2190 Clear Lake Rd., West Branch, MI; Bob Ruzanski, (517) 345-8018; fax (517) 345-8018

USA Raceways, 6083 Dixie Hwy., Bridgeport, MI 48722; Dave Killingsworth, (517) 777-7USA

Vicksburg Off-Road R/C Raceway, 50201 Silver St., Vicksburg, MI 49097; Jeff Schroeder, (616) 375-8591

Village Hobbies-n-Crafts, 195 N. Elm, Hesperia, MI 49421; Alan or Fran, (616) 854-1374

Village R/C Raceway, Prairie Ronde St., Decateur, MI 49045; Chuck Nolke, (616) 423-7878

West Michigan R/C Racers Club, 814 E. Railroad St., Hastings, MI 49058; Doug, (616) 948-2287 or Pat, (616) 945-3873

Westside R/C Raceway, 4335 Lake Michigan Dr., Grand Rapids, MI 49504; George Oriikowski, (616) 791-9902.(Open May through December)

MINNESOTA

Duey's Hobbies & R/C Raceway, 6600 Cahill Ave., Inver Grove Heights, MN 55076; Duey Carlson, (612) 450-1721

Grand Rapids R/C Speedway, 2209 Hwy 2 East, Grand Rapids, MN 55744; Aaron Voges, (218) 326-6751

Greater Minnesota Racin' Place, 3302 Southway Dr., St. Cloud, MN 56301; Jon Jackson, (320) 252-9768

J's R/C Raceways, Rte. 2, Box 266, Starbuck, MN 56381; Jay Campbell (320) 239-4827

Minn-E-Golf & Hobby, 9100 Park Ave., Elk River, MN 55330; (612) 441-8365

Northwoods Hobby Raceway, 2635 Hwy 25 North, Brainerd, MN 56401; Tom Grogg, (218) 829-9257

Paul Bunyan Raceway, Rte. 1, Box 468, Bemidji, MN 56664; Brad Trask, (218) 243-2749

Ray's Raceway Park, 105 3rd Ave. NE, Glenwood, MN 56334; Dan Winter, (320) 634-5246

R/C Racing World, 235 Main Ave. North, Harmony, MN 55939; Mark McKay, (507) 886-5931 or (507) 886-2224

Southside Speedway, 2241 Marion Rd. SE, Rochester, MN 55904; Kevin Guy, (507) 281-3233

Time R/C Raceway, 20 West Lake St., Chisholm, MA 55719; RV. (218) 254-4321

Trackside Racing, 443 8th Ave. NW, New Brighton, MN 55112; Winton Oftelie, (612) 633-2112

Wild West R/C Speedway, 2822 Piedmont Ave., Duluth, MN 55811; Roger Deloach, (218) 727-6248

MISSISSIPPI

Fast Freddy's Raceway, 20390 Hwy. 49, Saucier, MS 39574; Mark Payne, (601) 832-0315

Joe McFaden Hobbies, 1619 51st Ave., Meridian, MS 39307; Joe McFaden, (601) 483-7000

Small Cars Unlimited, 820 Cooper Rd., Jackson, MS 39212; (601) 372-FAST

MISSOURI

All Seasons Hobby, 152 O'Fallon Plaza, O'Fallon, MO 63366; Bob Daniels, (314) 281-8767

B&L Hobbies & Raceway, 2800 Anchor Dr., Park Hills, MO 63061; Bob Marler, (573) 431-9444

Blue Vue Speedway, 12019 E. 47th St., Kansas City, MO 64133; Mark Randol, (816) 358-0238

Columbia R/C Trax, 1502 W. Bus Loop 70 (Exit 125)., Columbia, MO 65202; Gary Phillippe, (573) 682-3993

Fire Mountain Raceway, 8647 Commercial Blvd., Pevely, MO 63070; Dan Gordon, (314) 475-6449

Greentree R/C Racepark, St. Louis Dirt Burners R/C Club, Marshall Rd., Kirkwood, MO; (314) 831-2194

Ozark Mountain Speedway, Rt. #2 Box 50, H-Highway and County Rd. 31, Noel, MO 64854; Clayton Younker (417) 475-6222

Ozarks R/C Raceway, Hwy 13N, Brighton, MO 65781; Gene Rhodes or Ron Hawkins, (417) 742-4376 or (417) 742-7223

North Missouri Raceway, 223 Graves St., Chillicothe, MO; Billy Johnston, (816) 646-1120

RealBlue Vue Speedway, 24204 State Rt. 58, Pleasnt Hill, MO 64080; Steve Hale, (816) 540-5584

Wilson's R.C. Speedway, 204 Southwest Dr., Kennett, MO 63857; Keith Wilson (573) 888-9223

MONTANA

Stormer Raceway & Slot Motorplex, P.O. Box 126 Hwy. 2 East, Glasgow, MT 59230; (406) 228-4569

NEBRASKA

Goodyear Superspeedway and Off-Road, 4021 North 56th, Lincoln, NE 68510; Tom or Bob, (402) 464-5000

Mr. Bill's, 450 West 2nd St., Hastings, NE 68901; Bill J. Ries, (402) 462-4865

O.N.R.O.A.D., 3307 N. 58 St., Omaha, NE 68104; Cook Jacobs, (402) 556-8674

RC Motorsport Off-Road Raceway, 5600 Mass Rd., Papillion (Omaha), NE 68133; Marty Stepanek, (402) 593-6133

Salvation Army South Corps, 4032 Harrison St., Omaha, NE 68164; James Frye, (402) 734-3414; fax (402) 734-3415

Siouxland R/C Car Association, 1800 Dakota Ave., South Sioux City, NE 68776;Jeff, (402) 494-1525

Winners' Circle, 3368 N. 88th Plaza, Omaha, NE 68164; Robert Conner, (402) 571-1821

NEVADA

Dansey's Indoor R/C & Hobbies, 741 N. Nellis, Las Vegas, NV; David Lugo, (702) 453-RACE

Silver State RC Club, 400 South Saliman #33, Carson City, NV 89701; Michael Geist, (702) 884-0375

Western R/C Raceway, 6404 Richmar, Las Vegas, NV 89139; Randy Grigg, (702) 260-9222

NEW HAMPSHIRE

Axis Racing R/C Dragway, 4197 High St., Hampton, NH; Dan Peterson, (603) 926-5211

Economy R/C Speedway, 4 Maple St., Winchester, NH 03470; Harold Thomas, (603) 239-4482 or 239-6470

Open Season Sports Center, Rt. 302, Lisbon Rd., Lisbon, NH 03585; Joseph Wiggett. (603) 838-6602

Robert's Railroad & Hobbies, 1335 1st NH Turnpike—Rt.4, Northwood, NH 03261; Robert M. Jeffers, Jr., (603) 942-7659

RT 106 Racepark, 743 Clough Mill Rd., Pembroke, NH 03275; Douglas Graves, (603) 224-RACE

NEW JERSEY

America's Hobby Center Inc., 18300 Tonnelle Ave., North Bergen, NJ 07047; John Many, (201) 662-0777

Ray's American Raceway, 142 Wilson Ave., Englishtown, NJ 07726; Ray Whitehead, (908) 446-3737

Family Hobbies Raceway, 3576 N.W. Blvd. & Weymouth Rd., Vineland, NJ 08360; Linda Vogel, (609) 696-5790

Golden Hobbies Raceway, 415 Erial Rd., Pine Hill, NJ 08021; John or Iona Golden, (609) 782-1222

Jackson R/C Racing, P.O. Box 565, Christopher Columbus Blvd., Jackson, NJ 08527; Al Sodano, (732) 364-6422

Jefferson Speedway, 5494 Berkshire Valley Rd., Oak Ridge, NJ 07438; (201) 697-7525

Jerry's Hobby Center & Raceway, 336 Rt. 22W, Greenbook, NJ 08812; Jerry or Gary, (908) 752-6030

LBRA Track, 392 Warburton Pl., Long Branch, NJ 07740; (908) 222-5122

Millville R/C Oval, 114 N. High St., Millville, NJ 08332; William Denstoz, (609) 327-4640

Pit Stop Dragway, 100 Campus Rd., Totowa, NJ 07512; Kimberly Frank, (201) 956-7223

On Trax Hobbies, 1549 Rte. 70, Browns Mills, NJ 08015; Joseph DiGirolamo, (609) 735-0422

R/C Shag Arena, 690 Jendi Pkwy., Totowa, NJ 07513; Amber Beggell, (201) 956-7223

South Jersey Cost Controlled Racing, 25 Jacksoon Lane, Sicklerville, NJ 08081; Ray Murray, (609) 629-4809

The Race Place, 1151 Hwy. 33, Farmingdale, NJ 07731; John Fary, (908) 938-5215

NEW MEXICO

Meerscheidt R/C Raceway Park, Meerscheidt Recreation Center, Walnut and Hadley by BMX, Las Cruces, NM 88005; Robert Heinsen (505) 526-6856 or Jim Meerscheidt (505) 523-2995; email MEERSCH@aol.com

NEW YORK

BarnStormers, MD #1 Old Oxford Rd. Chester, NY 10918; Lou, (914) 469-8206

Beach Hill Speedway, 1760 Beach Hill Rd., Watkins Glen, NY 14891; Jim Riley, (607) 535-2616

Brian's Off-Road Track, 1124 N. Forest, Williamsville, NY 14221; Brian Was, (716) 633-8155

Brockport Speedway, 6000 Sweden Walker Rd., Brockport, NY 14420; Gil & Betty Glidden, (716) 637-6224

Brownie's Pro & Sport Hobbies, 124 Bennett St., Staten Island, NY 10302-1426; John Brown, (718) 727-2194

BSK Hobbies & Raceway, 120 Main St., Hornel, NY 14843; Bruce Harris, (607) 324-4011, (800) 603-0197.

C&D Raceway, 12542 NYS Rte. 12E, Chaumont, NY 13622; Chris or Don Bourquin, (315) 649-5403

Capital District R/C Racers, 27 Venus Dr., Albany, NY 12205; Keith Green, (518) 783-8036

Chipmunk Hill R/C Speedway, 217 Pine St., Theresa, NY 13691; Ted or Pete House, (315) 628-5065

Frogtown Hobbies, Rt. 37, Mini Pines Village, Hogansburg, NY 13655; Dennis White, (518) 358-3686

Hacr's Hobbies & Raceways, 120 Cayuga St.,Canal View Mall, Fulton, NY 13069; Jack LaTulip, (315) 598-7063

Hobby Images R/C Raceway, 89 Jerusalem Ave., Hicksville, NY 11801; Chris LaRussa, (516) 822-8259

Jerry's Raceway, 111 S. Applegate Rd., Ithaca, NY 14850; Jerry and Lori Achilles, (607) 277-0940

LI ¼-Scale Racers, 63 Horton Dr., Huntington Station, NY 11746; (516) 351-5384

Long Island Raceway, 168 Broad Hollow, Farmingdale, NY 11735; James, (516) 845-7223

The Model Shop, 1 Lakewood Ave., Monticello, NY 12701; Richard Ciminoi, (914) 791-6075

Performance Plus Radio Control Speedway/ The Hobby House, 1141 ½ Jones & Gifford Ave., Jamestown, NY 14701; (716) 488-1772

P.R.O. Speedway, 5 Washington St., Cattaragus, NY 14719; Marc Pritchard, (716) 257-3101

Radio Hill Raceway, 1219 Shannon Corners Rd., Dundee, NY 14837; Bill Brewer, (607) 243-8641

Rampage R/C, 27 Fuller Lane, Hyde Park, NY 12538; Brian Walker, (914) 229-1379; (914) 229-2456

R/C Competition Corner, 2413 Brewerton Rd., Mattydale, NY 13211; Lori and Cos Ciririello, (315) 455-8718

R/C Sport Hobby, 69-57 Juniper Blvd. South, Middle Village, NY 11379

R&S Hobbies, 356 Macedon Ct. Rd., Fairport, NY 14502; (716) 425-3722

Ringwood Junction, 1922 Dryden Rd., Freeville, NY 13068; Steve Miller, (607) 347-4198

Schoharie Co. R/C Car Club, P.O. Box 126, Cobleskill, NY 12043; (518) 922-6982

Southern Tier Raceway, 88 Paige St., Owego, NY 13827; Anita Harding, (607) 687-5395

South Shore Hobby & Raceway W. Roe Blvd., Patchogue, NY 11772; Don Hauck, (516) 758-5567

Tri County Remote Control Car Club, 33 West Decker St., Johnstown, NY 12095; Jim Sprouse, (518) 762-8884

Tri-state Area Radio Control Model Auto Club (TARMAC), 28/30 Mountain View Rd., Poughkeepsie, NY 12603; Todd (914) 342-5409; tracksite (914) 454-8276

Walt's Hobby, 2 Dwight Park Dr., Syracuse, NY 13209; (315) 453-2291

Westfield R.C. Speedway, 27 Clark St., Westfield, NY 14787; John or Jared Lindstrom, (716) 326-2339

Whitestone, 30-56 Whitestone Expy. (Dept. of Motor Vehicles), Flushing, NY 11374; Rudolf Ardilla, (718) 966-6155

ZOAR Road Speeedway, 15318 Armes Ct., Gowanda, NY 14070; David & Gordon Ackler, (716) 532-9463

NORTH CAROLINA

A&J R/C Models, 2051 Anthony Rd., Burlington, NC 27215; Jerry Loye or Andrea Thompson, (910) 227-4556; fax (910) 227-1001

Another Zito's Mobile MASCARR Inc., 412 E. Blume St., Landis, NC 28088; Carmen Esposito or Pat Youngerman, (704) 451-3293

The Antique Barn, 2810 Forest Hills Rd., Wilson, NC 27893; Steve Seidlinger, (919) 237-6778

Atlantic Coast R.C., 8-A Lockhead Ct., Greensboro, NC 27409; Charlie Higgins or Harry Johnson (910) 664-1277

Badin Shore Raceway, 1730 Jackson Lake Rd., High Point, NC 27263; Jimmy or Tim Martin, fax (910) 431-6407

C/C Hobby Speedway, 8358 U.S. Hwy. 220 Bus. N., Randleman, NC 27317; Steve & Mary Cox, (910) 495-3482

C&H Raceway, 1400 N. Cannon Blvd., Kannapolis, NC 28083; Camera & Hobby Shop, (704) 933-5321

Cape Fear Speedway, 207 Harley Rd., Wilmington, NC 28401; Bob Justice, (910) 452-2354

Carolina Dragway, 907-D Warsaw Rd., Clinton, NC 28328; (910) 592-4569

Chatham R/C Raceway, 326 Reno Sharpe Store Rd., Bear Creek, NC 27207; Dwight Fields, (919) 898-2991

Hobby Club R/C Raceway, 1241 Buck Jones Rd., Raleigh, NC 27606; Hobby Club, (919) 460-8838

King R/C & Super Speedway, 143 Industrial Dr., P.O. Box 897, King, NC 27021; Chris Smith, (910) 983-5598 or (910) 883-3969

Ride& Slide R/C Raceway, 5319 Yadkin Rd., Fayetteville, NC 28303; Jim Woodman, (910) 425-5276 or Bill Culbertson, (910) 867-4202

R&J Off-Road Racing, 6172 Blalock Rd., Lucama, NC 27851; Robert Williams, (919) 239-0853 or Jonathan Jenkins, (919) 746-2703

Radio Jockey's Parkway, "RJ's," Rt. 9, Box 651, Fay, NC 28301; Tony Starling, (910) 486-4820

Rosewood R/C Speedway, 651 Community Dr., Goldsboro, NC 27530; Glenn Elam, (919) 731-4734

Southern RC Motorsports Club, Hwy. 17S., Shallotte, NC 28459, P.O. Box 1651; Mark Whitt, (910) 754-4902 or Eddie Ferster, (910) 754-8528

Ultratrax,5505 Palmers Branch, Leland, NC 28451; Mike Williams, (910) 313-0350

NORTH DAKOTA

Hacienda Hills Speedway, 20 Hacienda Hills, Minot, ND 58701; Kenny Duchscherer, (701) 839-4419

Northern Mini Racers, P.O. Box 415, Minot, ND 58702; Roger Lee, (701) 839-5294

River City R/C, 2714 Main Ave.; Fargo, ND 58103; Chris Hughes, (701) 235-1272

Surrey International Raceway, RR 1, Box 37, Norwich, ND 58768; Marlen Lenton, (701) 728-6760

OHIO

Aerotech Raceway, 409 Applegrove Rd., North Canton, OH 44720; (330) 499-1300

Canton R/C Raceway, 2206 13th St. NE, Canton, OH 44705; Dan Mauger, (330) 833-3091

Classic Hobbies, 1994 E. Waterloo Rd., Akron, OH 44312; Walt Ellis, (216) 733-6400

CR Raceways Emporium, 323 Center St., Ashtabula, OH 44004; Virginia Gagat, (216) 992-3833

CORCAR/ Sams Club, 128 Amity Rd., Galloway, OH 43119-8732; Bill Stevenson, (614) 870-7159

Columbus R/C Racing Club (C.R.C.R.C), Franklin County Fairgrounds, Hilliard, OH 43026; Jeff Crowell, (614) 236-1783

D&D Hobby Center, 1344 Lexington Ave., Mansfield, OH 44907; Eric Radio (419) 756-9771

D&J R/C Raceway, 801 W. Market St., Orrville, OH 44667; Don Yoder or Mark Nussbaum, (330) 682-4266

Fun for All Raceway, 675 College Dr., Batavia, OH 45103; Steve Donaldson, (513) 732-0440

Greentown R/C Raceway, 3353 Perrydale, Greentown, OH 44630; Chuck Lambert, (330) 364-6585

Hobby Shop Raceway, 2096 Miamiburg, Centerville Rd., Centerville, OH 45459; The Hobby Shop, (937) 436-6161

Hobby World, 3499 SR 59, Ravenna, OH 44266; Tom Fry, fax (330) 296-0894

Lafferty R/C Raceway, Box 153, 70228 Hurrah St., Lafferty, OH 43951; Chris Christman, (614) 968-4818

Lakes Hobbies, 3425 Manchester Rd., Akron, OH 44314; Roy Spencer, (330) 645-6912

Medina R/C Raceway, 754 N. Court St., Medina, OH 44256; Bill Aholt, (216) 723-0255

Mid American Raceway, 13150 Airport Hwy., Swanton, OH 43558; Bill or Chuck, (419) 475-9459

Performance R/C Club of Ohio, 2206 13th St. NE, Canton, OH 44705; Greg Ledbetter, (216) 453-7089

Scooters Hobby Hut, 234 Robbins Ave. #D, Niles, OH 44446; Dave "Scooter" Evans, (216) 544-9411

Shiray's Hobby & RC Raceway, 19930 State Route 117, Waynesfield, OH 45896; Ray Zimmerman, (419) 568-8055

TARCAR, 7216 Nebraska Ave., Toledo, OH 43617; Bill Bridges, (419) 826-3859

Tri-State R/C Auto Racers, Joyce Park, Hamilton, OH; Ernie Bauhoffer, (513) 528-2052

Van Wert R/C Raceway, 144 E. Main St. (above Hoverman Music), Van Wert, OH 45891; Mark Davis, (419) 232-2112

Y-City Hobby & Speedway, 120 S. 6th St., Zanesville, OH 43701; Kevin McKenna, (614) 455-3025

OKLAHOMA

Adams Creek R/C Speedway, 5207 S. 194th E. Ave., Broken Arrow, OK 74014; John Beighle, (918) 355-1416

Competition R/C, 100 SE 89th, Oklahoma City, OK 73149; James or Louise Brown, (405) 634-0809

Coweta Hobby & Speedway, 310 S. Broadway, Coweta, OK 74429; Derialdo Seabolt, (918) 486-3948

R/C Speedway, 1401 N. Vanburan, Enid, OK 73701; Sean or Jessica Hillery; (405) 237-5504

Remote Control Race Course, 400 S. Vermont Ave., Ste. 104, Oklahoma City. OK 73108; Rick or Steve, (405) 947-RACE

Wild Country Speedway, 127 South Main, Porter, OK 74454; Charles McCollough, (918) 685-0372 or (918) 687-1686

OREGON

Competition Racing Association, 17941 NE Gleason, Portland, OR 97230; Mark Taylor, (503) 761-1334

D.I.R.T. (Diamond International Race Track), 65540 73rd St., Bend, OR 97701; Daleyne and Edward Gleitz, (541) 388-2932

Junior Vehicle Speedways, 3090 Starwood Ct., Medford, OR 97501; (541) 779-3090

Pit Stop Hobby, 634 N. Coast Hwy., Newport, OR 97365; Richard Wood, (541) 265-2825

R/C Craze Speedway, 300 Ashland Lane, Ashland, OR 97520; Shawn Lazareff, (541) 482-4786

R/C Plus Hobbies Raceway,1857 25th St. SE, Salem, OR 97302; Ron Smith, (503) 364-9188

R/C Speed Center, 2810 N. Pacific Hwy., Medford, OR 97501; Gene and Betty Jean Skelton, (541) 779-8298

Yamhill County R/C Car Club, 722 Morgan Ln., McMinnville, OR 97128; Larry Rucker, (503) 472-7234

PENNSYLVANIA

A&D's Bumps & Jumps, RR7, Box 7395C, Stroudsburg, PA 18360; Dan Ambrosio, (717) 424-1750

A&E Raceway, Latrobe 30 Plz., Latrobe, PA 15650; Bruce Parker, (412) 539-7130

Bachman's Speedway & Hobbies, Box 306, Effort, PA 18330-0306; Jeffrey Bachman, (610) 681-5845

Benders Junction Speedway, 2300 Benders Dr., Bath, PA 18014; Gerald Wambold Jr., (610) 759-0161

Brookville Hobby Shop, 170 Main St., Brookville, PA 15825; Mark Tonell, (814) 849-7385

CEB Motors R/C Div., 5743 Molly Pitcher Hwy., Marion, PA 17235; Charlie Booze, (717) 375-4635

Columbia Racing Association, 128 N. Front St., Philipsburg, PA 16866; Lurch Hammal, (814) 342-7114

Cooks Way Raceway, Cook's Way, Mt. Pleasant, PA 16666; Bob Rhodes, (412) 547-5719

Cressona Mall Speedway, Rt. 61, Pottsville, PA 17901; (717) 385-3506

DC Ultra Trax, 13 York Rd., Wycombe, PA 18974; David Cowan, (215) 672-5200

Dreamboat Hobbies, 2810 Pennsylvania Ave. W., Warren, PA 16365; Louie Dussia, (814) 723-8052

Fantasy RC's and Hobby, 2315 W. 12th St., Erie, PA 16505; Frank Francis, (814) 453-6337

Hipkin's Hobbies, 402 W. Avondale Rd., West Grove, PA 19390; Doug, (610) 869-8585

Hobby America Raceway, 5 Fitzsimmons St., Duke Center, PA 16729; Dan or Mike Coast, (814) 966-3765

Koontz's Home & Hobby Center, 1205 Hoover St., Pittsburgh, PA 15204; (412) 331-3866

Kranzel's R/C Raceway & Hobbies, 415-B Bosler Ave., Lemoyne, PA 17043; David or Stuart Kranzel, (717) 737-7223

Little Plum R/C Hobbies, RR 1 Box 330, Lock Haven, PA 17745; Larry Duck, (717) 769-1984

Lugnut Raceway, 1713 Bethlehem Pike, Hatfield, PA 19446; Bill Henning or Kathy Anderson, (215) 822-5831

Marshall's R/C Raceway, RR 4, Box 640, Honesdale, PA 18431; Bill or Dot Marshall, (717) 729-7458

The Mushroom Bowl, 960 W. Cypress St., Kennett Square, PA 19348; Bruce or Drew, (610) 444-1850

Pinion Twisters, 3M Plant, Green Ln. and Mitchell, Bristol, PA; Mark, (215) 632-2344 or Tony, (215) 742-3560

Pit Stop Hobbies, 262 W. Main St., Mount Joy, PA 17552; James Stoudt Jr., (717) 653-6222

Prop & Wheels Raceway, 139 W. Broad St., Tamaqua, PA 18252; Gil Walters, Prop & Wheels Hobbies, (717) 668-2288

The Raceway at River Junction, 1216 4th St. (behind cemetery), Beaver, PA 15009; (412) 728-5571

RC Ave. Raceway 324 McKinley Ave, Latrobe, PA 15650; Scott Smith, (412) 537-5501

RC Outfitters RCO Raceway 519 Broadway, Hanover, PA 17331; Chris Shaffer, (717) 633-9490

R/C Pro Speedway, Millville Rd., Bloomsburg, PA 17815; John Swisher, (717) 387-0266; fax (717) 387-4937

R/C Pro III, 910 Chestnut St., Coal Twp. (Shamokin), Shamokin, PA 17866; John Swisher, (717) 648-7763

Riverside Raceway, PA Ave. W & Hickory, Warren, PA 16365; Jeff, (814) 723-4211

S.A. Hi Banks, Hahn's Dairy Rd, Palmerton, PA 18071; Scott Andrews, (610) 826-4583

Sinking Spring Race Center, 237 South Hull St., Sinking Spring, PA 19608; Randy Gelsinger, (610) 670-0760

Staub Bros. R/C Speedway, 31 Locust St., Gettysburg, PA 17325; Todd or Scott Staub, (717) 334-5445

TnT Raceway, Randolph Rd., Great Bend, PA 18821; Frenchie, (607) 775-1750 or Ed Kraft, (717) 967-2604

Trains & Lanes Raceway, 3825 Northwood Ave., Easton, PA 18045; Jeff Setzer, (610) 253-8850; (800) 447-4891

Willow Mill Speedway, 37 N. Season's Dr., Dillsburg, PA 17019; George Verbowitz, (717) 432-4445

Willow Run R/C Raceway, 135 Wright St., Corry, PA 16407; Jim Small, (814) 664-8147

World A.T.L.A.S./P.A.R.C.E. R/C Raceway Hobby Shop & R/C Club, Chester Exchange Mall, 10th & Morten St., Chester, PA 19013; Darryl, Lee or Marc, (610) 874-2540

PUERTO RICO

Cindra R/C Track, Carr 7787 KM 1.6, Bo Beatriz Adentro, Cidra, Puerto Rico 00739; Humberto (Tito) Lizardi, (787) 739-1532

Dorado Offroad R/C Track, Pista Atletica Bo. Higuillar, Dorado, Puerto Rico 00646; Roberto Lamoso/Jaime Ramos, (809) 796-5603 or (809) 796-1734

Hacienda Muñoz R/C Track, Carr. #14, Juana Diaz, PR 00795; (809) 837-7083

RHODE ISLAND

SK Hobbies Inc., 15 Carl St., Johnston, RI 02919; Slim or Keith, (401) 453-1440

Tri-State R/C Raceway, 205 Hallene Rd., Warwick, RI 02886; Raymond Dean, (401) 738-4908

SOUTH CAROLINA

Extreme R/C Raceway, 5976 Grace Lane, Myrtle Beach, SC 29577; Kevin Bullock, (803) 236-2083

The Grove Racing Center, 939 S. Anderson Rd., Rockhill, SC 29730; Mike Durham or Don Faris, (803) 327-4121

Hobbies and More, 1570 S. Main St., Darlington, SC 29532; Jerry Pollard, (803) 393-0355

J&M R/C Hobbies, 5341 Dorchester Rd., Evanston Plaza, N. Charleston, SC 29418; Mike Smith, (803) 552-9449

Midway Hobby and Raceway, 707 Sulphur Springs Rd., Greenville, SC 29611; Allen A. Dodson, (864) 246-6335

ORA Atomic Racing Facility, 373 Boyd Pond Rd, Aiken, SC 29803; Bill Jackson, (706) 855-0846 or (803) 642-0314

SOUTH DAKOTA

Action R/C Raceway, 107 N. Main, Mitchell, SD 57301; (605) 996-6895

Boomerans Raceway, 105 N. Main, Hartford, SD 57033; Ed Smithback, (605) 528-7345

Dakota Off-Road Racers, 2989 W. Br. Co. 12, Aberdeen, SD 57401; (605) 226-0604

Goldtrax Raceway, 409 E. High, Lead, SD 57754; Steve Brown, (605) 584-2355

K&B Speedway, 27283 SD Hwy. #115, Harrisburg, SD 57032; Mike Kosetin, (605) 743-2582

R/C Action Raceway, SE Corner at 484th & Hwy. 38, Sioux Falls, SD 57105; Brian Cox, (605) 373-0511

TENNESSEE

D&M's Downtown Raceway, 2703 U.S. Hwy. 411S, Maryville, TN 37303; (423) 681-8919

Hillside R/C Raceway, 4194 Oakhill Rd., Dayton, TN 37321; John and Rusty Tipton, (423) 775-4739

Lawson Raceway, 152 Joel Rd., Oliver Springs, TN 37840; Anthony Lawson, (206) 815-0379

Machine-Head Straits, 938 Grandmere Rd., Lawrenceburg, TN 38464; Larry and Eliane Sanders, (615) 762-6630

MSA R/C Racing, Rt. 12 Box 489 B, Crossville, TN 38555; D.R. Findley, (615) 456-0027

Sparta Raceway Park, 32 N. Main St., Sparta, TN 38583; Carl (Buddy) Elrod, Rt. 5 Box #652, Sparta, TN 38583; (615) 836-8450 or (615) 761-3407

TnT Raceway, 643 Loop Hollow Rd., New Tazewell, TN 37825; Cliff Swett, (423) 626-9065 or (423) 869-8942

W.O.W. Raceway, 59 Luray Rd., Beech Bluff, TN 38313; Kelly Bean, (901) 427-7874; email: windix60@pipeline.com

TEXAS

Big Mike's R/C Raceway, 1405 W. Cotton St. (behind the Locker Room), Longview, TX 75604; (903) 297-7814

Comanche Trail RC Park, City Park, Big Spring, TX 79720; Allen Nichols, (915) 263-4241

Command Hobbies, 6929 Airport Ste. 146, Austin, TX 78752; Tony Bermudez, (512) 458-2324

Drycreek Raceway, 5903 Co. Road 2297, Qunilan, TX 75474; Micky Alphin, (903) 883-4060

Eastex Raceway, 45000 Hwy. 59 N., New Caney, TX 77357; Brent Mahaffy, (713) 399-9777

Fastrack Raceway, 301 Edith Drive, El Paso, TX 79924; Hector Gonzalez, fax (915) 779-4524

***Flip & Spin* R/C,** 5957 Jones Rd., Bryan, TX 77807; Garland Crabb, (409) 822-7311

Hal's Hobby Raceway, 1440 Bessember, El Paso, TX 79936; (915) 591-2213

The Hobby Center Raceway, 4104 Stan Schlueter Loop, Ste. 1, Killeen, TX 76543; Lawrence Remick, (817) 690-7311

Hobbycraft Speedway, 819 N. Main St., Corsicana, TX 75110; Keith Hoffman, (903) 872-6761

Hobbytown USA, 7676 FM 1960 W., Houston, TX 77070; Fred Pfafman, (713) 955-7097

Hobbytown USA, 999 E. Basse Rd., Suite 177, San Antonio, TX 78209; Joe Sena or Clark Baisdon, (210) 829-8697; fax (210) 829-8707

Indy R/C World, 220 Saturn Rd., Garland, TX 75041; Steve Webster, (214) 271-4844; fax (214) 271-4502

Keyser's Hobbies, 1643 Texas, College Station, TX 77840; Bill Bennett, (409) 693-8095

MBRC Off-Road Raceway, 204 D&E Valley Lane, Kennedale, TX 76133; (817) 292-5055

North Houston Speedway, 11847 Spears Rd., Houston, TX 77067; Bob or Carol Hillin, (713) 872-2471

North Texas 1/12 Scale Association, 3905 Sandia, Plano, TX 75023; Dean Densmore, (972) 519-0324

Performance Raceway, 1106C Witte Rd., Houston, TX 77055; Jorge Tabush or Terry Schmid, (713) 464-4458

Rev It Up Raceway, 3076 Kellar Rd., Smithville, TX 78957; Rev, Alton T. Edwards, (512) 360-5443

Rick's R/C Raceway, 23B Scenic Loop, Boerne, TX 78000; Rick, (210) 981-2245 or Rich, (210) 590-1805

Rough Country, 905 Jacksboro Hwy., Wichita Falls, TX 76301-5310; Robert Kerr, (817) 322-2453

Star/Car Raceway, 5802 Patton St., Corpus Christi, TX 78415; Glen Stead, (512) 949-8525; Race Hotline, (512) 881-6105

T&T Eagle, 161 W. Spring Creek Pkwy., #601, Plano, TX 75023; Tony Welborn, (214) 517-0562

Texas Speedway, 6707 Chimney Rock, Bellaire, TX 77401

Tiger's Den R/C Speedway, 702 E. Broad St., Mansfield (DFW), TX 76063; Bob Burns, (817) 477-5513

T.Q. Offroad Raceway, 6236 Quail, El Paso, TX 79924; Efren Saenz, (915) 821-7522

Triple Jays R/C Raceway, Rte. 4, Box 720, Allen, TX 75002; Jeffrey Jay Johnson, (972) 562-7967

Warehouse Radio Controlled Raceway, 612 W 4th St., Amarillo, TX 79101; Craig or Darren Waddell, (806) 374-6485

W.E.S. Hobby Race, 980 S. Fourth St., Beaumont, TX 77701; Edmond Richards, (409) 839-4929

Wild Bill's Raceway, 535 E. Shady Grove, Irving, TX 75060; Lynn Morgan or Tom Nix, (214) 438-9224

UTAH

Intermountain R/C Raceway, 8481 W. 2700 S., Magna, UT 84044; David Mott, (801) 250-8303

Payson R/C Raceway, 955 South Main, Payson,UT 84651; Gus Wood, (801) 224-3852 and Lasca Wood (801) 222-8677

WOR Raceway, 3170 Brinker Ave., Ogden, UT 84401; Brian Worton, (801) 393-2530

VERMONT

Barre Town R/C Club, 14 South Main St., Wall St. Complex, Barre, VT 05641; Russ Tribble or Pete Perreault, (802) 888-2860 or (802) 476-9458

Bradford R/C Racing, Main St., Bradford, VT 05033; Seth Bean, (802) 222-9674

Stoughton Pond Raceway, Stoughton Pond Rd., Perkinsville, VT 05151; Rick Adams, (802) 263-9321

VIRGINIA

Bob's Hobbies & Raceway, 7422 Brandycreek Dr., Mechanicsville, VA 23111; Bob, (804) 746-2758

Brown Brothers Hobbies, 924 North Main Street, Dumfries, VA 22026; Joel or Bob Brown, (703) 221-5746

Cooper's R/C Race Center, 4000 Sago Rd. (969), Chatham, VA 24531; Norris Cooper, (804) 724-7342 or (804) 724-4182

DRCW Raceway, Debbie's RC World, 2200 Commerce Parkway, Virginia Beach, VA 23454; Les Modlin, (757) 340-6681

Gloucester Scale Hobbies, 2352 George Washington Memorial Highway, Hayes Plaza,Hayes, VA 23072; Rob Thein, (804) 642-3484

Hobby Hangers Speedway, 14014 D Sullyfield Cir., Chantilly, VA 20151; Kwang or Billy, (703) 631-8820

The Hobby House, 116 Edds Ln., Sterling, VA 20165; Oppie, (703) 444-0333

KC's Radio Control & Repair, Rt. 4, Box 312, Trents Ferry Rd., Lynchburg, VA 24503; Curtis or Kim Wright, (804) 384-8596

Olde Towne Hobby Shoppe, 9105 Center St., Manassas, VA 22110; Arnie Levine, (703) 369-1197

Race World Hobbies, 6102 Lakeside Ave., Richmond, VA 23228; Larry Boyd, (804) 553-8040

Roadmasters/ Rick's Hobbies, 12201 Balls Ford Ave., Manassas, VA 22110; Rick, (703) 330-6833

Shamroc Raceway, P.O. Box 3739., Winchester , VA 22601; Kevin Allen, (540) 662-0403

Thunder Road RC Racing, P.O. Box 1022, Troy, VA 22974-1022; James Palmer, (804) 589-8174

Trackside Hobbies, 1920 E. Pembroke Ave., Hampton, VA 23663; Rick Cardwell, (757) 723-4170

Trainlano R/C Racing, 5661 Shoulders Hill Rd., Suffolk, VA 23435; Frank Stevens, (757) 488-5454

WASHINGTON

Alfie's, 108 South K St., Aberdeen, WA 98520; (360) 533-6638

A-Main Raceway, 14011 NE 3rd Ct., Vancouver, WA 98685; Monty Coleman, (360) 571-8404

Burien Toyota R/C, 15025 1st Ave. South, Seattle, WA 98148; Ray Meek, (800) 654-6456

C&C Raceway, 266 Lind Ave. NW Revton, WA 98055; Charles Lakin, (206) 227-5167

Four Season R/C Racing, 2941 Sleater Kinney Rd. NE, Olympia, WA 98506; Gary and Sharon Brown, (360) 491-2430

Hale's R/C Raceway Park, 10611 136th St. E. Puyallup, WA 98374; Walt Hale, (206) 845-7675

Hannegan Speedway, 4212 Hannegan Rd., Bellingham, WA 98225; Dana Hoggarth, (360) 734-4090

Raceway Hobbies, 188 Sunset Ave. S., Edmonds, WA 98020; Brian Bodine, (206) 774-3285

Schmidt's Auto Parts, 10305 Old Hwy. 99, Marysville, WA 98271; Jon Failla, (206) 653-8838

Spokane Indoor Raceway, 6422 E. 2nd Ave., Spokane, WA 99212; Dave Mapston, (509) 534-RACE

Tacoma R/C Raceway, 6305 6th Ave., Tacoma, WA 98406; Scott Brown, (206) 565-1935

Tearor Raceway, Fantasy World Toy and Hobby, 7901 S. Hosmer, Tacoma, WA 98408; Dave Kleinman, (206) 473-6223

Ultimate R/C Raceway, 907 Cole St. #3, Enumclaw, WA 98022; Dan Daugherty, (360) 802-2388

Zep's Hobbies & Raceway, 530 Interlake, Moses Lake, WA 98837; Steve Ralph, (509) 765-8191

WEST VIRGINIA

Burr-Fab Raceway, 90 Davis St., West Union, WV, 26456; Mark Travis, (304) 873-2487

Fulton's R/C Raceway, 2646 Chapline St., Wheeling, WV 26003; James Fulton, (304) 233-5355

Left Turn Hobbies, 100 Saco Ln. (by Post Office), Glen White, WV 25849; Stretch, (304) 255-3930

Race Zone, Hopewell Rd., Rt. 8, Box 343A, Fairmont, WV 26554; Joe Clutter (304) 368-1000

WVRCA R/C Club, 142 West Main, Bridgeport, WV 26330; D.W. Weed

WISCONSIN

Bayland Hobbies, 951D Ashwaubenon, Green Bay, WI 54304; Dan or Jay Boettge, (414) 339-8288

Gary's Hobby Center, 3701 Durand Ave., Racine, WI 53403; Bill Phalen, (414) 554-8884

Hobbytown USA, 2061 South Koeller, Oshkosh, WI 54901; Hobbytown USA, (414) 426-1840

JJ's Dirt Heaven Hobby and Raceway, 6028 County Road K, New Frankview, WI 54229; Jeff Jansen (920) 866-9096

Mid-West Tri-Clone, 3745 Shuster, West Bend, WI 53095; Tom Holz, (414) 334-0429

NARCAR Raceway, 4331 E. Wall St., Eagle River, WI 54521; Mary O'Brien, (715) 479-5154

Pro-Star Racing, 726 Pine St., Green Bay, WI 54301; Chuck, (414) 494-1233 or Terry, (414) 469-5566

S&N's Trackside Hobbies and Raceway, 6045 N. Green Bay Ave., Milwaukee, WI 53209; Scott Ernst, (414) 351-1910

WYOMING

Collectable Creations Off-Road Oval Track, 1790 Dell Range Blvd., Cheyenne, WY 82009; Phil Severson, (307) 632-2156

Wind River R/C Racing Association, 113 S. 3rd E., Riverton, WY 82501; Bob Belding, (307) 857-2068

Xtreme Hobbies Raceway, 2724 Powder Basin, Gillette, WY 82718; Krieg Balls, (307) 682-6077

ARGENTINA

Club A. Velez Sarsfield, Av. J.B. Justo 9000, C.P. 1408, Buenos Aires; Jorge Herrero, 54-01-658-5851

Club A. Velez Sarsfield, Av. J.B. Justo 9000, C.P. 1408, Buenos Aires: Jorge Herrero, 54-01-658-5851

AUSTRALIA

A.C.T. Model Car Racing Club, offroad track—Wanniassa Raceway, Hyland Place, Wanniassa A.C.T.; indoor track—Epic Complex, Northbourne Ave., Canberra North A.C.T.; Gary Davey, 61-6-2871411

Aubry R/C Car Club, Aubry Showgrounds, Aubry, NSW 2640; Ron Langman, 060-247-128

Canberra Off-Road Model Car Club, Goyder St., Narrabundah, ACT 2604; Graham Brown, 61-6-241-3070

Central Coast ORRCC, EDSACC Sports Complex, Bateau bay, N.S.W. Australia 2261; Peter J. Knight, 61-43-693-698

Fast n' Fun, 250 Potreath Rd., Bellbrae West, Torquay, VIC 3228 Australia; Stephen Chara (613) 5266 1550 or (613) 5266 1556; fax (613) 5266 1556

Illawarra RCECC, Croome Sporting Complex, Albion Park Rail, NSW 2527; Mel or Andrew, 042-714-683

Lakeside R/C Racing Car Club, Hollywood Dr., Lansvale, NSW 2166; R. Bartolozzi, 62-2-907-9800

Melton Electric Circuit Car Association, Safeway Car Parkm Corner High St. and Coburns Rd., Melton, VIC 3337; Arthur Joslin, 61-3-9747-8805

Northern Districts Model Rally Club, Inc., Rear Stanford Centre, 16 Stanford Way, Malaga, Western Austrailia 6066; G. Thirlwell, 61 (9) 249 3855; fax 61 (9) 249 4778; email tony@ois.com.au

Penfield Park, DSTO Complex Salibury, Adelaide, South Australia 5108; Trevor Unsworth, (618) 8289-5010

Templestowe Flat Track Racers, Templestowe Reserve, Corner of Porter St. and Williamsons Rd., Templestowe, Melbourne, Victoria 31066; Renato Benci, 61 (3) 9553 4625

Wodonga R/C Car Club, 11 Murphy St., Wodonga, VIC 3690; Ron Langman, 61-60-247-128

BELGIUM

ATR-Alka-Tele-Racing, 3570 Stationstraat 21, Alken Limburg; 0032-11-25-49-03

Cartroubles Indoor Buggy Track, Jan Moonsstraat 52-56, 2160 Wommelgem, Belgium; Guy Ermes, 32-3-326-51-15; fax 32-3-326-51-01

MBV-Kampenhout, Teniersln 28, Kampenhout B1910, Belgium; Frank Mostrey, phone and fax 0-16-65-75-18

MRCZ, Centrum, De Burg, Belgium; Montie, 75-71-63

Model Racing Club Oudenaarde, Scheldekant, 9700 Oudenaarde, Belgium; A. Chanterie,32-55-31-36-48; fax 32-55-30-19-12

R.C.R., Peilstraat 43, Retie 2470, Belgium; A. Eelen, phone and fax, 32-14-379685

BRAZIL

Amoc Cassociaçao de Modelismo B. Camboriu, Junto ao Par Que Ecologico de Bal. Camboriu, Bal. Camboriu, S.C. 88.330-000; Leo Cesar, (047) 366-0001

Brasilia R/C Motor Circuit, Estacionamento do Estadio Mane Guarrincha, Brasilia, DF 70000, Brazil; Alexandre (Alex), 55-061-273-7205

Hobby Center, SQS.210 Bl.H Apt. 204, Brasilia, DF-Brasil 70.273; 061-242-0488

Hobby Planet Racing Club, Rod Dom Pedro 1, KM 1315, Campinas, Sao Paolo, Brasil 13091901; Daniel, Helio, Luciano, 019 258 2768

Jungle Drive, Rua Alberto Maranhao, No. 219 Icha do Gov, Rio de Janeiro, 21940-490; Paulo Brito, (021) 396-0851 or (021) 393-7449

MP Raceway, AV. Nacoes Unidas, 6815 Lapa, Sao Paulo; Gerd Heitrotter, 55-11-9819039; www.hpraceway.com.br

Off Roaders, Av. Guillerme Dummont Villargs, 317, Sao Paulo, CEP 05640; Waldir lelpo, (055) 011-260-5628; fax (055) 011-831-4931

Way of R/C Off-Road Cerrado, Rua Paraiba 1323, 1st floor, Belo Horizonte, Minas Gerais; Claudio T. Corrêa, (031) 227-6111, fax (031) 227-6869

CANADA

Action Weelz, 462 Turcotte, Vanier, Quebec, G1M 1R6; Regent Tardif, (418) 527-5756.

Advance R/C Raceway, 4181 Sheppard Ave. E, Scarborough, Ontario M1S 1T3; Albert Lau, (446) 321-8377

A&J Toronto R/C Raceway, 24 Main St., Building B, Unionville, Ontario L3R 2E4; (905) 305-1479

The All New R.C. World, 2633 Hwy. #6, Mt. Hope, Hamilton, Ontario L0R 1WO; Dave, (905) 765-2301, Larry, (905) 333-3297 or Brian, (519) 752-0044

ATN, Auto Teleguidee Nicolet, 2000 Rue Paul Hubert, Saint-Jean -Baptiste-de-Nicolet, Quebec J3T 1E5; Louis Durand, (819) 293-6097

Auto Sprint, 6065 Des Grands Prairies, St. Leonard, Quebec H3G 2R6; David Kalayjian, (514) 287-3503

Circuit J.C., 1283 Chemin, St. Philipe, St Polycarpe, Quebec J0P 1X0; Jean Castellon, (514) 267-7854

Circuit Pepsi, Centre de Location, 37 duRoi, Sorel, Quebec; (514) 746-8828

Circuit Plessis, 260 Rang 9 Ouest, Plessisville, Quebec G6L-2Y2; (819) 362-3743

Circuit R/C Pro, 1500 Chemin Sullivan, Vald'Or, Quebec; J9P 1M1; R/C Modeler Plus, (819) 874-3918

Circuit Teleguide St. Roch, 363-B St. Charles, St. Roch De L'Achigan, Quebec J0K 3H0; (514) 588-4254, fax (514) 588-6554

Circuit Teleguide Grand Prix, 9600 Ignace, Ste. C, brossard, Quebec J4Y 2R4; (514) 444-1286

Club Avatt, 244Jules-Richard, Deauville, Quebec JIN 3; Daniel Vanier, (819) 864-6262

Club RCSI, 44 Rue Holliday, Sept-Iles, Quebec G4R; Syivio Gerard, (418) 968-6575; Hobby Shop, (418) 962-6565

CRCCC, Box 309, Clinton, Ontario NOM 1L0; Eric Russell, (519) 482-9429

CTG, 450 Chemin de la grand ligne, Granby, Quebec; (514) 358-4419

CTL, 495 Industriel, Longeuil, Quebec; (514) 358-4419

Dustkickers R/C Raceway, 1785 Cypress Rd., Quesnel, British Columbia V2J 4B1; Darrell Dinsdale, (250) 747-2680

Dynamic Hobbies, 21 Concourse Gate, Unit 6, Nepean, Ontario, K2E7S4; Clark Freeman, (613) 225-9634

East Coast Model Center Raceway, 13 Glen Stewart Dr., Ste 1, Southport, Prince Edward Island C1A 8X9; Gary Stephen, (902) 569-3262

Evolution Speedway, 1935 Glengrove Rd., Pickering, Ontario L1V 1X3; Eric Lang, (905) 839-2084

Fast-Trax Speedway, RR 4, Trenton, Ontario; Russ McPeak, (613) 394-6411

Fly'N Bryan's Radical Raceway & Little Shop of Hobbies, RR #1, Ste. 12, Comp. 49, Chase, British Columbia, Canada V0E 1M0; Bryan Coffey/ Dani Potvin, (604) 955-0669

Honda House Motor Speedway, 384 Richmond St., Chatham, Ontario N7M 1P9; John Elliot, (519) 354-5530

Interior R/C Raceway, 34-1605 Summit Dr., Kamloops, BC, V2E 2A5; Martin Vannieuwenhuizen, (604) 374-1268 or (604) 374-8458

J-T International Raceway, 127 Milligan Lane, Napanee, Ontario K7R 8A1; N. O'Neill, (613) 354-0099

Leading Edge R/C Speedway, 731 Gardiners Rd., Kingston, Ontario K7M 3Y5, Canada; Mike and Tony Daicar, (613) 389-4878

Mid-Canada R/C Speedway, 1678 St. James St., Winnipeg, Manitoba R3H 0L3; Richard Driedger, (204) 339-6566

Minatures & Passions, 204 St. Charles, #103, Ste. Therese, Quebec, Canada J7E 2 B4; Gilles Lachance, (514) 979-7989

MORRAC Raceway, 6449 Crowchild Tr. SW., Box 36060, Calgary, Alberta T3E 7C8; (403) 254-1386

Off-Road R/C Raceway, 76 Eddystone Ave., North York, Ontario M3N-1H4; Ron Lefebvre, (416) 740-0536

Prince George Radio Controlled Car Club, 202 Explorer Cres., Prince George, B.C. Y2M5R8; Doug Waller, (604) 561-0035

Quintrax Speedway, 610 Dundas St. East, Belleville, Ontario K7K 2M1; (613) 962-1414; fax (613) 962-7306

Randy Shantz Raceway, 1015 W. 14th St., North Vancouver, British Columbia; Steve Mulhall, (604) 945-3888

R/C Champ Raceway, 670 Progress Ave., Rear Unit #13-16; Scarborough, Ontario, M1H 3A4; Ben, Matthew or Louie (416) 289-8717

Recreation R/C Raceway, Hwy 16 and Ferry Ave., Prince George, BC; Doug Waller, (604) 561-0035

Ronbo's R/C Racing, RR 1 Glen Walter,Cornwall,Ontario K6H 3G4; Ron Giroux, (613) 936-0176

Rousillon Hobby Track, 177-D St-Jean Baptiste, Chateauquay, Quebec J6K 3B4; (514) 698-2151

Sheldon's Raceway, Box 597, Cutknife, Sasketchewan; Sheldon Bradlow, 398-2232

Spinnin Wheel Raceway, RR 1, Ariss, Ontario NOB IBO; (519) 824-1614

South Okanagan Roadhogs, Skha Lake Rd., Penticton, BC; Willie Lemm, (604) 492-5698

Steeltown Speedway, 3580 Kirk Road West, Binbrook, Ontario L0R 1C0; Paul Snyder, (905) 227-7508

Strathclair Park, Old Garden River Rd., Sault Ste. Marie, Ontario P6A 5T1; (705) 759-1855

Sudbury Organized Auto Racing, 765 Barrydowne Rd., Sudbury, Ontario P3A 3T6; Ken Moore, (705) 524-5339

Thunder Alley Raceway, Lambton Mall, 1380 London Rd., Sarnia, Ontario N7S 1P8; Rob Smith, (519) 882-3361

Vancouver R/C Road Racers, #100-2733 Barney Hwy., Coquitlam, British Columbia V3E1K9; Roger Brown, (604) 945-3888

COLOMBIA

Club De Automodelismo Colombiano, Centro Recreativo Cafam, Kilometro 14 Autopista Norte, Santafe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

Club De Automodelismo Colombiano, Centro Comercial Guaymaral, Kilometro 16 Autopista Norte, Santafe De Bogota, D.C. Colombia; Jorge Delgado, 1-6130588

Garoso Raceway, Avenida Libertadores con Diagonal Gran Colombia, Cucuta, Colombia; Gabriel Rodriguez, 975-751892

CYPRUS

Racing Model Club, Kennedy Ave. N. 42,Nicosia, Cyprus; Andrea Sotiriou, 493186; fax 493229

DENMARK

Brondby Motor Club, Roskildevej 460 Brondby, Denmark 2605; Soren Boy Holst, 45-36-472-462

Holstebro R/C Buggy Club, Mozartsvej 7500 Holstebro, Denmark 2600; Michael Brusholt, 45-97-412-734

Klub 144 Raceway, Bagsvaerdvej 144A, 2800 Lyngby, Denmark; Henrik Carstens, 45-42-88-3691

Rainbow Raceway, Eriksvej. 9 Glostrup, Copenhagen 2600; P. Christiansen, 45-52-848-504

Thor Minirace Odense, Sohusvej 255, Alleso, Odense, Behind Alesso Hallen (Sport Centre), Odense, Denmark; Ulrich Rasmussen, 45-65-303-707

DOMINICAN REP.

Adoca R/C Speedway, Feria Ganadera, Santo Domingo; (809) 220-5266

La Barranquita R/C International Speedway, Santiago; (809) 582-2303

ECUADOR

Hobby Centro A.C.R.O. Club, Via a Turi Km O.S., Cuenca-Ecuador; Teddy Jaramillo, 593-7-831-289; fax 593-7-817082

ENGLAND

Chessington Radio Car Club, Surbiton Sport Club, Riverhill Estate, Worcester Park Rd., Worcester Park, Surrey; Ian Spiller, 0252-20657

Hampshire Racing Center, Viables Craft Center, Basingstoke, Hampshire; Tony Eudola 44-1276-61402

Hinckley RCCC, Three Pots Inn, A5 Wathing St., Hinckley, Leicestershire; Bruce, 01455-890580

Worcester Model Car Club, Christopher Whitehead High School, Bromwich Rd., St. John's, Worcester WR2 6Q9; Mr. Hardy

FRANCE

Auto Model Club de l'ouest, 45 rue de Menez, Lojerhet, France 29470; Peuziat Michel, 02-98071764

Auto Electron, 35, rue B. de Ventadour, Limoges, France 87000; M. Boudoul, 55 062763

Crame Roncq, 64 rue du Becquerel, 59370 Mons el Baroeul; Michael Hondekyn, 33-20042755

CSRM, 17 Grande Rue Ave., de Saint-Rambert, 69009 Lyon; Pierre-Yves Monfroy, 06 78880852

Lorgies Bolides, rue Beau-Riuz, 62840 Lorgies, France; Mme. Hourdequin Sabine

GERMANY

Dreykorn Raceway, Heuchlinger-Hauptstr. 43, Lauf, 91207; Hermann Hensel, 09123-81457

MC Koln, Bottgerstr., Worringen, Germany 50769; Ralf Habel, 02733-477493

Mini Car Club Dortmund, Kortschstr. 4, 4600 Dortmund 13, Germany; Roland Schwan, 0231/213609

Oberhausen-Altstaden, Am Fserder-turm., Oberhausen, Germany 46099; Josef Holl, 0208-403676

Panik Raceway, Teutonen Str. 5, Jroisdorf, Germany 53844; Guido Kraft, 0224-400259

GREECE

EORA-Fanatix Racing, 20 Irinis Ave., Pefki, Athens 15121; Mr. T. Diamandakis, 8025556

GUAM

R/C International Raceway, P.O. Box GK, Agana; Robert (Buddy) Simpkins, (671) 477-3207

HONDURAS

Autodromo Accion, Quinta Santa Maria, San Pedro Sula, Honduras, Colonia Rivera Hernandez; Eduardo Hondal, (504) 52-2061

HONG KONG

H.K.R.C. Model Car Racing Club, Lot 2130-2137, Ko Po Tsuen, Sha Tau Kok Rd., N.T., Hong Kong; Alex Chan, (852) 659-2822

Kingsville Buggy Arena, Wong Chuk Yeung Village, Shatin, N.T.; Pak Yeung, (852) 607-0828

INDONESIA

1st Circuit, Kompleks Villa, Kalijudah Indah, Surabaya; 62-31-5681965

Cipaku Indah Speedway, J1 Cipaku Indah II/2, Bandung 40143, Indonesia; Cipaku Indah Hotel, Brad Lake, 62-22-210219

Karinda Off-Road R/C Car Model Circuit, Perumahan Bumi Karang Indah,J1 Karang tengah Rayam lebak bulus, Jakarta-Selatan 12440; Wiwied W. Soedarmadi, 62-21-7900878

Pondok Cabecircut, JL. Kunir No. 83, Pondok Cabe, Ciputat, Jakarta, Indonesia; Ali Agus Salim, 7403568-9; fax 7491533

Sentul World Hobbies, Citeureup Bogor Jawa Barat, Indonesia; International Circuit Hilton Hartanto, Ian Sentul International Sirkuit, KM 42 62-21-751-2439

ISRAEL

Ircca Off-Road, Rahanana, Israel; Yaron Zafris, (972) 030549937

Nahshoneat, Abba Nilel Silver Str. 64, Haifa, Israel 32809; Golan Levy, (972) 039386444 or (972) 04231252

ITALY

Associazione Modellisti Cossato, via P. Maffei, Cossato 13014, Biella, Italy; Zanellato Romildo, 015-405881; fax 015-922709

JAPAN

Courtney Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 81-61173-53674

Foster R/C Raceway, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; Camp Foster Arts & Crafts, 81-61173-53674

Hansen Off-Road, Camp S.D. Butler, Okinawa, Japan, FPO AP 96379; USMC Arts & Crafts, 81-61173-53674

Iwakuni R/C Track, PSC 561, Box 978, FPO AP 96310-0978; David T. Eck, 81-6117-53-3662

Misawa R/C Raceway, PSC 76, Box 2946, APO AP 96139-2946; Terry Brancheau, 81-17653-5181 ext. 222-5324

Yokota R/C Racers, PSC #78,Box 4274 APO AP 96326, Tokyo , Japan; Brad Johnson, 011-813-11-757-7655

Zama Off-Road Raceway, 17th ASGCM Unit 45013, Box 3232, APO AP 96338 Japan; SFC Ken Campbell, 81-3117-63-8478

KUWAIT

Inferno DX 4WD Track, P.O. Box 9167, Ahadi, Kuwait 61002; Yousuf Acqatari

LEBANON

Wild Willy RCC, Oscar St-Jal Eddie, Beirut, Lebanon; 00961-1-403751

MALAYSIA

Titiwangsa Raceway, Lot 128, Ampang Park, Shopping Centre, Jalan, Ampang, Kuala Lampur, Malaysia 50450; R.A.C.E. Sdn Bhd., 03-2614496

Jump Square Arena, Al21,SG, Buloh N/V, 47000, SG, Buloh, Selanhor, Malaysia; Thomson Chong, (603) 656-2513

MEXICO

Alces Off Road, Lopez Mateos y Rayod S/N, Ensenada, Baja California, BC 22830; Jorge Bustamante, 667-6-1476, 61477, 86729

Baja Jr., H. Valdez 151 Pte. Y Gmo. Prieto, Los Mochis Sinaloa 81200; Memo Asencio, Gaby Macias, 681-20276; fax 681-26430

Club Kyosho de Automodelismo Departino, Av. Pacifico 216 Coyoacan; Ajusco-Toluca Km 15.3 DE, Mexico 04330, Ing. Jorge Perez Holder, 525-544-08096; fax 525-544-7133

Cinamo Coca-Cola, Ruiz Cortines 620 Col. Central de Carga, Guadalupe, Nuevo Leon 67120; Sergio Garza, 83-35-70-09/79-32-33

Hobby Centro, 12 De Diciembre No. 3070-A, Guadalajara, JAL 45550; Alejandro Ortiz Del Toro, 36-21-46-28

Hobby's Formula, Au observatorio 457 DF 01120; 905-502-3620

Hobby Model's Raceway, Blvd. Garcia de leon, 1555, Morelid, Michoacan 58260; 431-5-01-22

Jaguar R/C Club, Calz. Zavaleta 116, Puebla 72150; Chema, Denise or Chiro, 22-31-00-91, 22-33-00-94

La Hielera, Prol Corregidora Nte 350, Queretaro, QRO C,P 76160; Jorge Morelos Rabell, 42-12-15-25

Pista Casino, Hotel Casino de la Selva, Cuernavaca, Morelos 16507; Luis Duhart, 73-19-12-38

R/C Racing Club, Obsidiana #2900, Zapopan, Jalisco 44560; Fernando Hernandez, 3-616-73-47

Tony's Track, Obregon 364 Sur, Culicán Sinaloa; Guillermo Prieto, 67-165708-168141

NETHERLANDS

H.F.C.C. Hollandia, De Werf 60, The Hague ,The Netherlands; G. de Jong, 031-070-3679820

NEW ZEALAND

Capital Model Racers, Avalon, Lower Hutt, New Zealand; Roger Whitmarsh, 04-566-5714

Counties R/C Raceway, Pukekohe Showgrounds, Station Rd., Pukekohe, New Zealand; R. Northcott, 09-23-86904

Harewood Radio Control Car Club, 550 Sawyers Arms Rd., Christ Church, New Zealand; Dean Johnson, 09-0-3880 344

M.A.C. Vlymen, Hendriklaan 6, Vlymen, Netherlands; Ju Kasteren, 31-73-517906

Papakura Indoor R/C Car Club, 25 Tainere Cres., Papakura, Auckland; Colin Perry, 09-298-4711

Western District R/C Off-Road Car Club, CNV Bancroft/Akatea Prive, Auckland; Chris, 09-838-5201

NORWAY

Aurskog R/C Club, Aursmoen, 1930 Aurskog, Norway; Tommy Gjeleseth, 47-63-86-21-61

Dalen Raceway, P.B. 728, 6401 Molde, Norway; Johnny Reitan, 94 64 52 95

Hadeland Raceway, 2750 Gran,Gran Norway;Dag Bakke-Nilssen, 61330405

Store-Baller Raceway, 2750 Gran,Gran Norway; O la Raastad, 61330225

PHILIPPINES

Boyel R/C Hobby Shop, Unit No. 10 Lucas Commercial Center, Marcos Hiway, Decemberamot, Antipolo, Rizal; Jose "Boy" Chua, 721-2555

Phillipine F1/Touring Club, Super Mall I, EDSA, Quezon City 1156; Raymond Aguilar/Ron Villaflor, 896-64-15/23-30-08

Philippine R/C Association, B.F. Homes Paranaque,Metro Manila 1700; Ronald/Manny Villaflor, 23-30-08

Quezon City Radio Control Club, Quezon City Memorial Cir., Quezon City; Benjie Lumanlan, 731-94-53

PORTUGAL

Aero Clube da Madeira, Rua do Castanheiro E-2, Funchal, Madeira, Portugal; fax 091-221265

SOUTH AFRICA

Banana County R/C Racing Club, P.O. Box 988, Margate, 4275; Dennis Steenmans, 27-0-391-20975

Frantic Raceway, Santam Plaza, Shop 16B, Welkon ; Wayne Roodt, fax and phone 27-57-35-72849;

Gordons Bay R/C Club (GBRC), Andrew Norman Sports Centre, Gordons Bay, Cape Province; Andre Hollander, 024-512865

Helderberg Radio Control Car Club, De Beers Soccer Club, De Beers Ave. Somerset West, Cape Province; Andre Hollander, 024-51-2865

Lowveld Radio Control Thunderdrome, Lion's Club Kanyamazne Rd., Nelspruit, Eastern Transvaal; Martin Van Der Merwe, 01311-534-6415

Parow Radio Car Club, Northerns Sports Complex, Parow, Cape Province; Stirling Spengler, 021-945-4957

Phoenix Raceway, 11 Tugela St.,Stilfontein, Transvaal; Lionel Edwards, 018-4842863

Pick 'n' Pay Model Car Club, P.O. Box 11654, Klerksdrop 2570; H. Grobks, (27) 18 46245421

Pietersburg Model Racing, Landros Marais St., Pietersburg, Northern Transvaal; Peter Van Vuuren, 0152-293-0700

R.C. Superbowl, Elsburg Sports Grounds, Elsburg, Johannesburg; Karl Fawcett, 27119076145

R.A.C.E. Off Road, Cecil Payne Stadium, Maraisburg, Gauteng; Derrick Plank, 682-2173

Rustenburg Off-Roaders, Olympia Stadium, Rustenberg, Northwest Province; Jan Van Vollenhoven, 0142-24-846

Pretoria Off Road R/C Club, Joost Bekker Caravan Park, Decemberville, Pretoria, Gauteng; Gert Swart, 012-377-3238

SPAIN

ADAM, Mina Flores de la Sienna, Madrid, Spain Alvaro Sarabia, 01-7471113

A.D. Diablillos, Morata De Jalon, 50.260 Zaragoza, Spain; Juan Carlos Vicente de Vera, 34-76-605350

Club Modelismo Catilla, P.O. Box 491, Burgos, Spain 09080; A.J. Pereda, 34-47-240130

Club Social Sevillana, Crta. Pulianas S/N, Granada, Spain; Oscar Saenz, 958-275282

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Outlaw-Ultima II, Puerto Rico 27, Madrid, Spain 28016; Juan Vacas, (34) 915197298

ROARCR, Naval Station, Rota, Spain (P.O. Box 53, FPO NY, NY 09540-0013); PO Kelly Sexton, 34-56-822652

CRAEM, La Elipa, Madrid, Spain; Pablo Llorente, 91-3865952

SWEDEN

Amalie Racetrack, Hjort Vagen 14, 5-46632 Sollenbrunn, Sweden; Tage Johansson

PROCAR Speedway, Industrigatan 8, 430 20 Veddige, Sweden; Lars Nordin, 46-0-340-38784; fax 46-0-340-38694

Sollenbrunn Miniracing Club, Hjortvagen 14, S-446 32 Sollebrunn; Tage Johansson, 46-322-40944

Staffanstorp Highway 1:8 Track, Nummer Ettavagen 5, Vag 108 fran Staffanstorp mot Lund, Staffanstorp 245 45 Sweden; B'rje Petersson, 46 0 46-256832

SWITZERLAND

E.M.B.C.M. Raceway, Mr. Lotfi Zarrouk, Bahnhofstr. 28, CH-8854 Seinen; Markus Schmid, 41-1-8605229

ERMC Raceway, 14 Ch de Taverney, 1218 Grand-Saconnex, Switzerland; M. Maurer, 19-41-22-798-9765

JMRCV-Terraindu Levant, Chemin ou Levant, 1290 Versoix, Geneva, Switzerland; fax 19 41 22 7790805

THAILAND

Bangkok R/C Spa Huamark, 164/1 Lardprao SOI 96, Wangthonglang Bangkapi, Bangkok, Thailand 10310; Mr. S. Sanghavasi, 662-931-8390; fax 662-587-1186

Hot Rod Raceway—Mr. Chairit Vongphate, 6/3 Soi Soonvijai Phetburi Rd., Hueykwang Bangkapi, Bangkok 10310; Mr. Vichai Vongphate, (662) 8602922-5

Radio Control Speedway, 16 Soi Suea-Yai-Utith, Rajadapisek Rd., Chatujak, Bangkok 10900; Mr. Noppakao and Mr. Suteerapong S., (66-2) 541-6398; fax (66-2) 541-6399

TURKEY

B&B OTO Güven Raceway, Gaziosmanpasa Sokak Kadiöky, Goztepe Parki, Istanbul, 0216-4186118, or 0216-3490742

VENEZUELA

R/C Mariche, KM4 Zona Industrial, Del Este Via Mariche, Caracas, DF 1070-A; Bruno Morganti, 58-02-241-3969 or 241-4993

Santa Paula R/C Club, Polideportivo de Santa Paula urbanization Santa Paula El Cafetal, Caracas, P.O. Box 66886 Plaza las Americas; Isaac Abecasis 02-2423954 or Franco Agrusa 02-4510314

WEST INDIES

Island Raceway, 8 Mile Post Jacks Hill, St. Andrew, Jamaica, West Indies; Rodney Littau, (809) 926-7034 or 927-1198

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The GasMan Cometh

Chris,
First let me say that *RCCA* magazine kicks A$$!! I own a Team Losi XXT and XX 'CR.' I have been looking into gas power for a while, and I really want a GTX. I have some questions about gas power, and since you seem to be the head guru of nitro power, I thought I would write you. Some of these questions may sound stupid, but bear with me!
1. How does the nitro fuel get pumped into the engine?
2. How do you stop?
3. How do you shut off a nitro engine?
4. When was the "Thrash Test" of the GTX?
Thanks for your time, and keep up the good work!
RCMan29594@aol.com

You know what they say RCMan ...
... the only stupid question is the one not asked. If you're familiar with Losi, stick with Losi for your nitro transition. If you do that, you'll be able to give more attention to what will be unfamiliar—the nitro part! (and the GTX is a great truck).
1. It doesn't get pumped in; it gets sucked in by negative crankcase pressure. When the piston sweeps up from bottom dead center (BDC) to top dead center (TDC), a semi-vacuum is created in the engine's crankcase and it's equalized through the carburetor. Air rushes in through the carburetor's venturi and—voilà!—air/fuel mixture induction takes place.
2. Gas-powered cars stop by means of a disk or drum brake that is actuated by the throttle servo's reverse throw. The brake is somewhere in the drive train—either on the drive shaft, as is the case on 4WD cars, or on the transmission's spur-gear shaft, as is the case on the 2WD Associated RC10T, or on the clutch bell, as is the case with the Losi GTX.
3. The best way to stop a nitro engine is to remove or pinch the fuel line with needle-nose pliers or a hemostat—AT IDLE SPEED. This method leaves as little unburned alcohol in the crankcase as possible. Alcohol is hydroscopic (attracts moisture) and can be a corrosive nightmare on the internals of your expensive engine.
4. A very long time ago, but we have a "2nd Look" planned for a future issue.
CC

Hi, Chris,
I am having a problem with the Dynamite pull-start on my GTX. The string keeps breaking and I have to change it about every four days to a week and a half. Which type of pull-start string do you recommend?
Thanks,
Richard

Richard,
What do I recommend? Stop pullin' that thing so hard!
Replace it with original equipment from Horizon Hobbies. When you get it rebuilt, try not to pull the starter cord all the way out. I know that when the engine doesn't want to run, you get enraged and start really pulling the thing as fast as you can while fully extending it. I know; I've been guilty of the same offense. If your face begins to look more like you're doing karate-board breaking than starting a glow engine, it's time to step back and collect yourself. Try to fight the urge. The pull-starter (and you) will last longer.
Good luck.
CC

Chris
I know you warned me about running 40% nitro, but, well ... it's not my fault! My stupid friend went and bought it for me, so don't blame me! Anyway, I just replaced all the fuel tubing, so now I'll try and yank on it and see if it starts. Would getting a glow plug be a good idea at this point? Or maybe 2 or 5, while I'm running the 40% through it? Thank you for responding to my earlier email; it's much appreciated by us mere mortals of R/C.
Eric

Eric, Eric, Eric,
What am I going to do with you guys who don't listen? OK, OK; if you *must* use up this gallon of 40% fuel, at least run it a bit rich. High-nitro fuel will allow a richer setting without a loss of power—that's an upside—so at least take advantage. Anyway ... yes ... a new glow plug should always be one of the first things you try. Even if it's glowing, it can still be working at only partial efficiency. As part of a process of elimination, always try a fresh one if you're having problems
One more thing Eric: STOP RUNNING 40%!
Have fun, man.
CC

Chris,
Your column is the best in the mag. I'll start by saying that I have no experience with gas cars, but I plan to purchase one soon—just have to decide what is good. (I also like the smell of nitro exhaust.) I know that you know glow power, so I would like to ask you a few questions:
1. Is a temp gauge a good thing for a gas R/C?
2. Is an FM radio a must for a gas car?
3. Is the Associated GT better than the Losi GTX?
4. Is a high-torque throttle servo necessary?
5. Would a .12 engine be better than a .15 engine for a gas beginner?
6. What exactly does the boost bottle do anyway?
7. How do you feel about the Traxxas Nitro Rustler?
8. How do I restart my engine if it accidentally quits and it has already reached the correct running temperature?
9. Do I need EPA for brake/throttle?
10. Why does my engine die when I go for the brakes?
11. Will switching to a cooler glow plug help?
12. How about using a starter motor?
Chris, just one more thing: in your opinion does ...
STOP! STOP!! STOP!!!
I GIVE IN. YOU GUYS WIN.
I CAN'T TAKE ANYMORE!!
That's it. In a few months, you'll see the first of my new columns for nitro lovers; I simply see no other way out. See how I'll work myself to the bone for you guys? But there's something *you* can do for me. Help me come up with a name for this new column. It's the least you can do after forcing me to do more work.
—Chris

This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire *Car Action* staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o *R/C Car Action*, 100 East Ridge, Ridgefield, CT 06877-4606. My Internet address is: chrisc@airage.com.

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